The Cost of Obesity in Nova Scotia

Prepared for

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1. Purpose and Context of This Study

Statistics can be powerful and dangerous tools. There are two basic ways in which they are frequently misused, which can help explain both why the epidemic increase in obesity has been largely ignored, and how this serious health risk might be reduced.

(i) Where do we Shine the Spotlight?

What we count and measure signifies what we value, which in turn determines the policy agenda and policy priorities. No matter how important we proclaim something to be, if we assign it no value in our measures of progress, it will not get attention in the policy arena. It is like telling students that a term paper is extremely important and the most valuable learning experience of the semester, and that it is worth 2% of the final grade. We should not be surprised if, no matter what we *say,* the students ignore the paper and put all their energy into the final exam.

That is an apt metaphor for our current measures of progress, which are narrowly based on economic growth, market statistics, and the GDP (gross domestic product). While we all proclaim the importance of a safe and peaceful society, a healthy and knowledgeable population, a clean environment, healthy natural resources, and strong and caring communities, we do not count these values in our core measures of progress. And like the students' term paper, they command insufficient attention in the policy arena.

Indeed our economic growth statistics, watched so closely by experts, leaders and journalists, frequently send messages to policy makers that are dangerously misleading. Because the GDP uncritically adds up the total quantity of goods and services produced, irrespective of whether they create benefit or harm, we currently count crime, smoking, gambling, pollution, illness, accidents and junk food consumption as economic growth and "progress," simply because we spend money on them. Indeed, the more trees we cut down and the more fish we sell, the faster the economy will grow.

Our natural resources have no value in our measures of progress. Healthy people contribute far less to the economy than sick people. A peaceful society makes the economy grow far more slowly than a violent one like the United States, where imprisonment and the security industry alone contribute $100 billion a year to the GDP. The Exxon Valdez contributed far more to the US economy by spilling its oil than if it had delivered the oil safely to port. No wonder we are confused when we try to evaluate our progress as a society according to the economic growth statistics.

And so it is not surprising that an obesity epidemic has crept up on us almost unnoticed. Nor that we have lost almost all our old trees in Nova Scotia with no corrective action even now. Nor that 98% of our "health care" budgets are actually illness-treatment expenditures. Health promotion and disease prevention are like the students' term paper, occupying just 2% of our health budgets. Nor is it surprising that we paid no attention to the 8.7% decline in voluntary work in Canada in the 1990s, a loss in our quality of life

that was unnoticed and ignored because unpaid work counts for nothing in our measures of progress. Voluntary work data are collected only once every six years.

While we spend millions of dollars collecting and reporting GDP information monthly, we have only ever had two comprehensive dietary information surveys in Nova Scotia -- in 1970-72 and 1990. Nutritional education budgets pale next to food industry advertising budgets, -- $30 billion a year in the U.S., and a major contribution to the GDP. So our "food education" effectively comes from industry. Not surprisingly, the National Institute of Nutrition and the Nova Scotia Nutrition Survey both found that food labels, nutrition panels, ingredient lists and food claims are not well understood and frequently misinterpreted.[1] Data on rates of overweight among young people are almost non-existent in Canada.

In short, the statistics we do pay attention to are powerful because they shape the policy agenda. And they are dangerous when we shine the spotlight on a few selected numbers and leave vital quality of life indicators obscured in darkness. The Genuine Progress Index (GPI) begins to remedy this flaw simply by shining the spotlight more widely, and by explicitly counting, measuring and valuing population health, natural resources, unpaid work, educational attainment and other quality of life indicators in our core measures of progress.

Unlike the GDP, the GPI also counts crime, pollution, sickness and accidents as costs rather than gains to the economy. While "more" is always "better" in the GDP, less crime, smoking, pollution, sickness, and greenhouse gas emissions are signs of progress in the GPI. Simply put, the GPI goes up when the costs of these activities decrease. In economic terms, the consequent savings can be invested in more productive activities that improve the quality of life. This is common-sense economics!

That is the context for this report. While overeating, smoking, longer work hours and hospital bills make the GDP grow, the GPI counts obesity, cancer, heart disease and stress as costs. By measuring those costs explicitly, we hope to direct policy attention to preventive measures that can not only improve the well being of Nova Scotians, but save huge sums of money in the long term.

The World Health Organization has called the spread of overweight and obesity in the world "one of the greatest neglected public health problems of our time."[2] A primary purpose of the GPI is to bring important neglected aspects of our well being out of the shadows so that they can be squarely faced and given priority in the policy arena.

(ii) Symptoms and Causes

Once we begin to shine the spotlight in previously dark corners, statistics can still be misused and misinterpreted. That is because all aspects of reality are completely related. Social, economic and environmental realities are not separate. Local trends are not isolated from global ones. There is, therefore, a real danger that statistics are read as

isolated facts and that superficial symptoms are confused with underlying causes. That danger exists even when previously hidden facts are unearthed.

For example, the purpose of this report is not to make overweight Nova Scotians feel bad about themselves, nor to make Nova Scotians feel they are worse than other Canadians because they have higher rates of obesity. For a start, the obesity epidemic is a global trend, and the dramatic rate of increase in Nova Scotia matches that in the rest of Canada and in the world. Secondly, obesity is both a cause of illness and also a symptom of deeper social trends, including a junk food explosion, a more sedentary lifestyle, higher rates of stress and overwork, poverty, and nutritional illiteracy. To individualize the statistical results and separate them from these social realities is to misuse them.

By going beyond market statistics, and by bringing together a broader range of social, economic and environmental realities, the Genuine Progress Index attempts to clarify linkages among factors that impact our quality of life and standard of living. There is, in the end, only one purpose to this report, and to the GPI as a whole. That is to direct policy attention to measures that can improve well being, and to give us a set of benchmarks of progress towards that common goal.

Obesity is a highly sensitive subject. Overweight people frequently have a poor self-image. To repeat: It would be a most unfortunate misuse of statistics if this report were to reinforce such individual sensitivities, or even to make those with healthy weights feel smug and self-satisfied. The social trends responsible for our obesity epidemic pervade our society and affect all of us; and the economic costs of obesity are borne by everyone.

On the other hand, these numbers could be *well* used to rouse awareness of a serious, deadly and overlooked health risk; to spur investment in nutritional education, healthy lunch programs and physical activity in schools; to treat toxic foods with the same alarm that we now reserve for cigarettes; to identify and reduce stress and its causes; and to foster health promotion and improve population health. The last section of this report suggests correlations between obesity and other social trends that point to policy initiatives with the potential to stem the obesity epidemic.

In short, the purpose of this report is not to make overweight Nova Scotians feel bad about themselves. On the contrary, it is to suggest that Nova Scotia could take the lead in turning around a highly destructive global trend, and to encourage communities, schools, policy makers, health professionals and ordinary individuals to work together to improve the health and well being of all our citizens. GPI Atlantic commends Cancer Care Nova Scotia and the Public Health and Health Promotion Division of the Nova Scotia Department of Health for initiating that movement through this very important conference.

2. Healthy Weights: Definitions

Overweight and obesity are best measured with special equipment; and obesity in particular requires the measurement of fat as well as relative weight. For that reason the most recent *Statistical Report on the Health of Canadians* does not use the term "obesity" at all.[3] Nevertheless, "Body Mass Index" (BMI) has become an internationally accepted indicator of relative weight, and is calculated by dividing weight in kilograms by height in metres squared.

According to this measure, a BMI of 20 to 24.9 is defined as a healthy weight, meaning that it confers no known health risk or likelihood of premature death. A BMI in this range translates into about 140 to 170 pounds for a 5-foot-10-inch man; and about 105 to 135 pounds for a 5-foot-2-inch woman. Beginning with a BMI of 25 (which is about 150 pounds for a 5-foot-5 woman and 174 pounds for a 5-foot-10 man), researchers have found a gradually increasing risk of premature death and disease.[4]

The *Statistical Report on the Health of Canadians* defines a BMI of between 25.0 and 26.9 as conferring a "possible health risk," and a BMI of 27.0 or greater as conferring a "probable health risk." On the other hand, the Canadian Medical Association Journal and several international studies do define obesity as a BMI of 27 or greater, and use that term even in the absence of separate measurements for body fat.[5]

The official Canadian standard today, using the BMI, is:

- Less than 20.0: "underweight"
- 20.0 to 24.9: "acceptable weight"
- 25.0 to 27.0: "some excess weight"
- More than 27.0: "overweight".[6]
-

This is different from the groupings used by the World Health Organization and the National Institutes of Health in the United States, which define "underweight" as 18.5 or less, acceptable weight" as 18.6 to 24.9, "overweight" as 25.0 to 29.9, and "obese" as 30.0 or more.[7]

The trends over time described in this report refer to individuals with a BMI of greater than 27.0. Despite the definitional difficulties described above, this report does use the terms "overweight" and "obese" interchangeably for that category for two reasons. Firstly, it is widely acknowledged that BMI measurements derived from self-reported data tend to under-estimate actual values by a factor of about 10%. In other words, a reported BMI of 27.0 may actually be closer to the WHO obesity standard of 30.0, and the prevalence of overweight and obesity in a given population is likely 10% higher than reported levels.[8]

Secondly, the term "obesity" is frequently used as a medical term to describe epidemiological associations with overweight. This report uses these associations to

estimate health impacts and costs, based on a costing study published in the Canadian Medical Association Journal that defines obesity as a BMI of 27 or greater.[9] We therefore follow that convention and use the term "obesity" here as well.

3. Health Impacts

Whatever definition is used, the real significance of the notion of "healthy" and "unhealthy" weights is simply their proven correlation with health outcomes. Even the studies that avoid the use of the term "obesity" agree that a BMI in excess of 27 confers significant health risks.

The American Cancer Society recently released the results of the most comprehensive study ever done on obesity and mortality. Examining one million people, the study found that overweight people have a higher rate of premature death even if they don't smoke and are otherwise healthy. The results were adjusted for age, education, physical activity, alcohol use, marital status, use of aspirin and estrogen supplements, and consumption of fats and vegetables. Harvard University endocrinologist, Dr. JoAnn Manson, concludes:

> *The evidence is now compelling and irrefutable. Obesity is probably the second-leading preventable cause of death in the United States after cigarette smoking, so it is a very serious problem.*[10]

Numerous studies have linked overweight and obesity to a wide range of health problems, especially cardiovascular disease, diabetes, and some forms of cancer.[11] Body weights below the healthy weight range, with a BMI under 20, may also signal health problems, including eating disorders like anorexia and bulimia.[12] However, the 1996-97 National Population Health Survey found only 6.3% of Nova Scotians with a BMI of less than 20, down from 9.6% in 1990, and 25% less than the national average. By comparison 56% of Nova Scotians have a BMI of 25 or more, up from 43% in 1990. Overweight is clearly far more of a problem here than underweight, and this report therefore focuses on the health impacts of obesity and overweight.

A Statistics Canada analysis of the 1996-97 National Population Health Survey data found that Canadians with a BMI of greater than 30 were four times as likely to have diabetes, 3.3 times as likely to have high blood pressure, 2.6 times as likely to report urinary incontinence, 56% more likely to have heart disease, and 50% *less* likely to rate their health positively than Canadians with an acceptable weight. Even at a lower BMI, between 25 and 30, Canadians had a significantly higher risk of asthma, arthritis, back problems, high blood pressure, stroke, diabetes, thyroid problems, activity limitations, and repetitive strain injuries.[13]

British Columbia medical researchers examined dozens of studies that assessed the relative risks for particular diseases in obese individuals (defined as those with a BMI of 27 or greater). From this they calculated the "population attributable fraction" (PAF) to estimate the extent to which the prevalence of each disease is specifically attributable to obesity. They found the strongest association with type 2 diabetes, more than half of

which could be prevented by healthy weights. Similarly, 32% of all cases of hypertension, 30% of pulmonary embolisms, 27% of endometrial cancers, 21% of all cases of gallbladder disease, and 18% of all cases of coronary artery disease are attributable to obesity. The researchers also found significant associations with postmenopausal breast cancer, colorectal cancer, stroke, and hyperlipidemia. [14]

Other studies have linked obesity to hormonal disorders, sleep apnea, infertility and impaired immune function.[15] A recent study of 41 children with severe obesity revealed that one-third had sleep apnea and another third had clinically abnormal sleep patterns. Another study reported that "obese children with obstructive sleep apnea demonstrate clinically significant decrements in learning and memory function." Among obese girls, puberty can begin before the age of 10, leading to a lifetime of endocrine disorders that can be emotionally devastating and costly to treat.[16]

A longitudinal study by researchers from the New England Medical Centre and U.S. Department of Agriculture Human Nutrition Research Centre in Boston followed 508 participants in the Harvard Growth Study conducted among Boston school children between 1922 and 1933. The researchers found that overweight teenagers were more likely to suffer from heart disease, colon cancer, arthritis or gout by age 70 than teenagers with healthy weights.

Regardless of whether they became overweight adults, these overweight teens were significantly more likely to have poorer health in later life. Indeed, by age 45, men who had been overweight as adolescents began to die at higher rates than those who had acceptable weights as teenagers. By age 70, their risk of death was twice as high.[17] Given this high risk of adverse health outcomes, it is unacceptable that there are currently no official Canadian data on obesity trends among youth, an omission that well illustrates the low priority accorded to population health issues in our current measures of progress (see section 1 above).

Other research suggests that weight gain can lead to the development of pseudo tumour cerebri, a brain tumour most common in women. A study of 57 patients with this tumour revealed that 90% were obese. A range of musculoskeletal disorders is also linked to obesity, including Blount's disease, a deformity of the tibia, and slipped capital femoral epiphysis, an orthopedic abnormality brought about by weight-induced dislocation of the femur bone. Both conditions are progressive and often require surgery.[18] In short, there is a very wide range of chronic illnesses linked to obesity, many of which require ongoing treatment, produce enormous, unnecessary suffering, and are costly to the health care system.

4. Obesity Trends: Nova Scotia and Canada[19]

Across Canada, rates of overweight (BMI = 27+) have more than doubled since 1985 from 13% to 29%. Today, 38% of Nova Scotians have a BMI of more than 27, compared to 18% in 1985 (Chart 1). (All figures in this section refer to the adult non-pregnant population, age 20-64.)[20]

Atlantic Canadians have the highest rates of overweight and obesity in the country. For population with a BMI of 27+, the top four provinces are: New Brunswick (41%), Newfoundland (39%), Nova Scotia (38%), and Prince Edward Island (37%), compared to the national average of 29%. For those with a BMI of more than 30, the top four are New Brunswick (20%), Nova Scotia (18%), Newfoundland (17%) and Prince Edward Island (16%) compared to a national average of 12% (Charts 2 and 3).[21] The *rate of increase* in obesity since 1985, however, is not markedly different across the provinces.

Canadian men are nearly 20% more likely to have a BMI of 30+ than women, and are 50% more likely to have a BMI of 27+. But there has been a steady increase in the prevalence of overweight among both men and women since 1985. In the Atlantic provinces the male-female gap is narrower than in the rest of the country: 40% of Nova Scotian men have a BMI over 27 compared to 35% of Nova Scotian women (Chart 4).[22]

Although this report focuses on overweight, it is noteworthy that Canadian women (14%) were nearly five times more likely to be underweight than men (3%), with nearly one in 4 Canadian women age 20-24 with a BMI below 20. Ten percent of Nova Scotian women have a BMI under 20 (Chart 5).[23]

When all categories of BMI are considered, there has been a steady decline in healthy weights (BMI = 20-24.9).[24] In 1985, 53% of Canadians and 48% of Nova Scotians had a healthy weight. In 1997, just 44% of Canadians and 38% of Nova Scotians had a healthy weight.

Canadians with less education are much more likely to be overweight than those with higher education. In fact, rates of overweight decreased with each successive level of education: 36% of Canadians with less than a high school education are overweight compared to 22% of those with a university education. Older Canadians are also more likely to be overweight than younger ones. A small part of the increase in overweight over time can therefore be ascribed to the aging of the population (Chart 6). Low income Canadians are also more likely to be overweight than those with higher incomes. [25]

Despite the vital importance of tracking this trend, there are no official Statistics Canada data on rates of overweight among young Canadians. The National Population Health Surveys track body mass index only for the non-pregnant adult population age 20-64. Nonetheless, the Heart and Stroke Foundation refers to surveys indicating a similar troubling increase in overweight rates among youth. According to Foundation spokesman, cardiologist Andreas Wielgosz, the incidence of obesity among Canadian

boys has risen to 22% from 16% and to 26% from 15% for girls in the last 20 years.[26] This matches measured trends in the United States, and indicates a clear need for Canadian data on youth weights.

5. A Global Epidemic

While the dramatic increase in the number of overweight Canadians and Nova Scotians is alarming, the trend is global and of epidemic proportions. In 1997 the World Health Organization for the first time referred to obesity as a "global epidemic."[27] According to one estimate, obesity has increased by 400% in the western world in the last 50 years.[28]

In March, 2000, the Worldwatch Institute in Washington D.C. published a report, entitled *Underfed and Overfed: The Global Epidemic of Malnutrition,* which found that for the first time in human history the number of overweight people in the world now equals the number of underfed people, with 1.1 billion in each group.[29]

Comparing specific countries, the report found that 56% of children in Bangladesh, 53% in India and 48% in Ethiopia are underweight, while 55% of U.S. adults, 57% of English adults and 50% of Germans are overweight (BMI = >25).[30] Overweight is spreading even in the developing world, with 36% of Brazilians and 41% of Colombians now overweight. Indeed, 80% of the world's hungry children live in countries with food surpluses, indicating that unequal distribution rather than food scarcity is the primary cause of hunger.

The report also found that one-fifth of U.S. children are now overweight or obese, a 50% increase since 1980. At the same time, a 1998 U.S. Department of Agriculture study found nearly one-fifth of American children are "food insecure," -- either hungry, on the edge of hunger, or worried about being hungry.[31]

According to the report authors, both the underfed and the overfed suffer from malnutrition, defined as a deficiency or excess in the nutrient intake necessary for health.

> *The hungry and the overweight share high levels of sickness and disability, shortened life expectancies, and lower levels of productivity -- each of which is a drag on a country's development.*[32]

Each year 20 million babies are born in the world with low birth weights due to maternal malnutrition, resulting in lifelong scars through impaired immunity, neurological damage, retarded growth and increased susceptibility to disease. Among the overweight, "obesity often masks nutrient starvation," as calorie-rich junk foods squeeze healthy items from the diet. In Europe and North America, fat and sugar now account for more than half of total caloric intake.[33]

Of all illnesses, adult-onset diabetes is the most closely associated with obesity, with more than 50% of cases attributable to overweight.[34] Given the epidemic increase in obesity since 1985, it is not surprising that the global population with this illness has jumped nearly five-fold from 30 million in 1985 to 143 million in 1998. The average age

of diabetics is getting younger, and the global incidence of the disease is expected to double to 300 million by the year 2025.[35]

In sum, Nova Scotians are part of a disturbing global trend in which obesity is one symptom of a growing polarization that portends poor health outcomes for both extremes. There is a suggestive parallel trend in the growing polarization of work hours in Canada, with increasing numbers of Canadians working longer hours than ever and an equal number unable to get the hours they need to make ends meet, with higher stress levels at both poles. A recent Japanese study found that the overworked and the underemployed had an equal risk of heart attack.

There is a striking parallel here in the health risks experienced by the overfed and the underfed, -- a parallel that recommends a balanced middle way avoiding extremes for society as well as individuals, -- a basic prescription that has been a canon of health since ancient times. Scientists have observed that the only organism in nature with limitless growth as its dogma is the cancer cell, an apt metaphor for the illusion of limitless economic growth that pervades our social consciousness and continues to propel the unhealthy polarization and over-consumption that are driving the global obesity epidemic. The natural world, by contrast, thrives on balance and equilibrium, a more appropriate metaphor both for health in general and to overcome the obesity epidemic in particular.[36]

It is critical to acknowledge this wider context both to overcome the tendency to self-blame by overweight individuals, and to point to social actions that can help overcome these destructive trends. If the dramatic proportions of the neglected global obesity epidemic are acknowledged in the context of widespread chronic hunger and malnutrition, then greater equity and moderation become guiding principles for constructive future social action.

6. The Economic Costs of Obesity in Nova Scotia

We need to balance our health care system with an increased emphasis on health promotion and chronic disease prevention (that...enable individuals to live healthy, full lives characterized by not smoking, active lifestyles and healthy diets....Physical inactivity, obesity and smoking continue to cost the system both financially and in human terms. In fact studies show that these adverse health risks translate into significantly higher health care charges.

Disease prevention strategies lower health costs because individuals consume fewer health care resources at all ages....Striking a healthy balance for our health system means reducing the demand for expensive high-technology health care -- and realistically, this can only be accomplished by reducing the burden of illness from chronic disease.

David MacLean, M.D., The Halifax Chronicle-Herald, January, 2000[37]

> *Because there are limited health care resources, disease-specific cost estimates are essential to facilitate priority setting and the allocation of future health care dollars to areas where the economic burden of illness is greatest.*
>
> C. Laird Birmingham, M.D., Canadian Medical Association Journal, Feb. 1999[38]

It has been estimated that health promotion and disease prevention currently account for only about 2% of most provincial health budgets in Canada. Yet investment in these areas is probably the only way to reduce long-term health care costs. Interventions to treat illness are generally very disease specific. By contrast, the *determinants* of health are known to be highly interactive, so that a wise strategic investment in one determinant will likely have spin-off benefits in several others.

For example, poverty is acknowledged as the most reliable predictor of poor health outcomes, and is also closely linked to low educational attainment and unhealthy lifestyles. Reductions in poverty among high-risk groups will also reduce rates of smoking, obesity and physical inactivity, cut long-term health costs, and improve population health.

Because the Genuine Progress Index emphasizes the linkages between social, economic, and environmental realities, it focuses on potential investments in the determinants of health as highly cost-effective means to improve health and well being. Rather than assess the cost only of the final outcomes of illness, as our current health budgets do, the GPI therefore estimates the economic benefits and costs of health determinants.

The following economic analysis does not deny the intense human suffering of the health effects of obesity. Rather, it attempts to focus attention on preventive measures that can reduce that suffering. At the same time, policy makers are bound to administer taxpayer funds in general and health care dollars in particular as wisely as possible, and must identify and target expenditures effectively and accurately to achieve the best return on investment. The more precisely health dollars are directed to high risk groups, the greater the long-term savings to the health care system, and the more resources are available for positive investments in social well being.

What are the costs of being overweight? Obesity has been shown to reduce quality of life, increase morbidity and lead to premature death.[39] One study estimated that 300,000 people die each year in the United States because of being obese.[40] If similar ratios held for Nova Scotia, that would mean a thousand unnecessary deaths a year in this province.

Older individuals with healthy weights and higher levels of physical activity are more likely to maintain independence and a high quality of life into old age, and are correspondingly less likely to use the health care system. As Dalhousie University's Dr. MacLean explains, disease prevention strategies that lengthen life expectancy "will

improve health outcomes and not lead to prolonged periods of disability," thus lowering health costs among the elderly.[41]

Obesity is particularly costly because it often results in chronic illnesses that require frequent and continuous use of health care resources. A study in the Netherlands found that obese individuals were 40% more likely to visit physicians than those with healthy weights, and were 2.5 times more likely to take drugs for cardiovascular and circulatory disorders.[42]

Aside from direct medical costs, obesity also produces a range of indirect social and economic costs. Obese individuals frequently experience psychological and social restrictions, negative peer attitudes and self-image, limited social, educational and professional opportunities, job discrimination, and under-achievement in education. The economy suffers a loss of productivity from disability and premature death due to obesity-related illnesses, and overweight workers have higher rates of absenteeism, and use of sick days and disability pensions. A 1995 Swedish study found that obesity accounted for 7% of lost productivity in that country due to sick leave and disability, and that obese workers were twice as likely to take long-term sick leave as those with healthy weights.[43]

Dr. Graham Colditz of Harvard University's School of Public Health has estimated the combined direct and indirect costs of obesity in the United States at $118 billion annually, the equivalent of nearly 12% of that country's health care expenditures. This far exceeds the $47 billion in direct and indirect costs attributed to cigarette smoking. Aside from these costs, overweight Americans spend another $33 billion annually on diet drugs and weight loss programs, all of which, needless to say, contributes mightily to that nation's Gross Domestic Product and economic growth rates, and is therefore interpreted as a sign of increasing prosperity and progress.[44]

(i) Direct Costs of Obesity, Nova Scotia

To estimate the economic costs of obesity in Nova Scotia, this study begins with an analysis of the "population attributable fraction" (PAF) due to obesity of ten diseases that have known comorbidities with overweight, based on the method used by Birmingham et. al in their Canadian Medical Association Journal (CMAJ) report. The PAF estimates the extent to which each disease and its health costs are attributable to obesity.[45]

Charts 2 and 3 demonstrate that 38% of Nova Scotians have a BMI greater than 27 compared to 29% of all Canadians. Following the method used in the CMAJ, the PAF for Nova Scotia is calculated using the following formula: PAF = P(RR-1)/[P(RR-1)+1], where P is the probability of a person being obese (BMI = >27) in a given population and RR is the relative risk for the disease in an obese subject. The medical costs attributable to obesity are then derived by multiplying the total cost for each disease by that comorbidity's PAF. The total disease costs are taken from Health Canada's *Economic Burden of Illness in Canada, 1993,* and adjusted for the Nova Scotia population.[46]

Assuming the same relative health risk for each disease for overweight Nova Scotians as for overweight Canadians, then the PAF and medical costs for each of ten selected diseases attributable to obesity in Nova Scotia are as follows (Table 1).

Table 1: (a) Relative Risks for Selected Comorbidities in Obese Subjects
(b) Population Attributable Fraction for Obesity in Nova Scotia
(c) Direct Health Care Costs Attributable to Obesity for Each Illness, Nova Scotia, 1997

Comorbidity	*Relative Risk*	*PAF (%) N.S.*	*Cost Attributable to Obesity(1997 $),NS*
Hypertension	2.51	36.5	24,267,711
Type 2 diabetes	4.37	56.2	15,010,255
Coronary artery disease	1.72	21.5	13,297,092
Gallbladder disease	1.85	24.4	5,203,767
Stroke	1.14	5.1	4,630,744
Hyperlipidemia	1.41	13.5	2,363,122
Pulmonary embolism	2.39	34.6	1,421,191
Colorectal cancer	1.16	5.7	774,414
Postmenopausal breast cancer	1.31	10.5	730,397
Endometrial cancer	2.19	31.1	483,339
TOTAL COST			**$68,182,031**

Source: C. Laird Birmingham et. al., *The Cost of Obesity in Canada,* Canadian Medical Association Journal, February 23, 1999, pages 484-487; adjusted to Nova Scotia values using Statistics Canada, *Health Indicators,* Table 00060211.IVT: "Population by Body Mass Index."

Notes on Table 1:

- Direct health care costs include hospital care, services of physicians and other health professionals, drugs, health research and other direct costs borne by the health care system.
- Comparative cost estimates also depend on the actual prevalence of the disease in addition to the particular PAF attributable to obesity. Since the numbers in this study are calculated from Health Canada's *Economic Burden of Illness* study, they are not rounded in this table. Nevertheless, they should be understood to be estimates rather than exact costs.
- Relative risk for disease in obese individuals is assessed by comparison with individuals of healthy weight (BMI = 20-24.9), where the latter has a value of 1.0.
- PAF can also be understood as the percentage of disease occurrence that could be avoided if everyone had a healthy weight.

As seen in Table 1, the cost of obesity in Nova Scotia for these ten illnesses is **$68.2 million a year.** These are direct costs borne by the health care system, and amount to **3.9%** of the province's 1999-2000 health budget.

However, this direct cost estimate is very conservative, and must be adjusted upwards to estimate the total direct cost of obesity, in order to account for the following factors:

a) Table 1 considers only ten illnesses for which comorbidities with obesity have been well established in the medical literature, and for which direct monetary costs can be determined according to specified diagnostic categories. Though these ten include some of the most costly and serious chronic illnesses linked to overweight, obesity is also known to be a causal factor in several other diseases, including osteoarthritis and a wide range of musculoskeletal disorders, gout, asthma, back problems, thyroid problems, repetitive strain injuries, hormonal disorders, sleep apnea, infertility, pseudo tumour cerebri, and impaired immune function that can increase susceptibility to infection. It is also responsible for activity limitations of various kinds.

   These conditions are not included in the estimates in Table 1, not because their relation to obesity is not well established, but simply because Health Canada's *Economic Burden of Illness* does not allow the cost share of these particular disorders to be separated from the overall costs of the larger diagnostic categories of which they are a part. For example, gout is included in that study's estimate for "endocrine and related diseases;" arthritis is included in "musculoskeletal diseases;" and asthma in "respiratory diseases."

   Arthritis and back problems are among the most widespread chronic conditions in Canada, each afflicting about 14% of the population.[47] Dr. Graham Colditz of the Harvard University School of Public Health estimates a PAF of 15% for osteoarthritis and other musculoskeletal disorders, meaning that 15% of their prevalence is due to obesity.

   If musculoskeletal disorders were included in the cost estimate, the total cost of obesity would be $18.4 million higher, or $86.7 million.[48] If the other excluded obesity-related diseases are also added, the direct health care cost of obesity easily exceeds $90 million annually, or 5.1% of Nova Scotia's total health care budget.

b) Capital expenditures in the health care system and other costs not specifically attributable to particular diseases are not included in the estimate of health care costs in Table 1 or in the estimate for all obesity-related illnesses in (a) above. Birmingham et. al found that total actual health care expenditures exceeded the amounts they took from the National Health Expenditures Database and allocated to specific illnesses by about 20%. [49]

   In fact, Health Canada's *Economic Burden of Illness in Canada* does include capital expenditures, "other institutions" (aside form hospitals), and other costs excluded in Table 1 in estimates of the total cost of illness in Canada. If *all* health care expenditures were included in proportion to the particular illnesses the system treats, the total direct cost of obesity would therefore be about 20% higher than listed in Table 1 and in (a) above.

c) The relative risk ratio for obese individuals (BMI = >27) is calculated above relative to the risk for non-obese individuals (BMI = <27). However, the Advisory Committee on Population Health, in its *Statistical Report on the Health of Canadians,* notes that individuals with a BMI between 25 and 27 incur a "possible health risk" due to "excess weight." [50] The massive one-million subject study conducted by the American Cancer Society also found a gradually increasing risk of premature death beginning with a BMI of 25.[51]

   In other words, if the relative risk ratio for obese subjects in Table 1 had been assessed in relation to individuals with *healthy weights* (BMI = 20-24.9) rather than in relation to non-obese individuals (BMI = <27), and if the disease costs due to *excess weight* (BMI = 25-27) were included in the cost estimates, then the economic cost burden of overweight in Nova Scotia would be significantly higher yet.

d) As noted above, several studies have found that the self-reported data from which BMI estimates are calculated are generally 10% lower than actual levels, because many overweight individuals under-report their actual weight. However the cost estimates given above assume that the self-reported data reflect the *actual* prevalence of obesity in the population. If this discrepancy were taken into account, the cost estimates might again be significantly higher.

Conclusion: When all these factors are taken into account, it is reasonable to conclude that unhealthy weights cost the Nova Scotia health care system at least $120 million a year, or 6.8% of the provincial health budget. As a proportion of the total health budget, this is comparable to estimates by Dr. Graham Colditz of the Harvard University School of Public Health for the United States, which has obesity rates similar to the Atlantic provinces.[52]

(ii) Indirect Costs of Obesity, Nova Scotia

The most conservative indirect economic cost of obesity is estimated by considering the loss of productivity resulting from disability and premature death due to obesity-related illnesses. In 1990 these costs were estimated at $23 billion in the United States.[53] More comprehensive estimates of indirect costs might include the range of other economic and social losses described above. Here we shall use only the conservative estimate.

Because time did not allow a detailed break down of indirect costs, this study simply uses the overall ratio of direct to indirect illness costs given in Health Canada's *Economic Burden of Illness.* That study estimates productivity losses due to mortality at 18.7% of the total cost of illness in Canada, and productivity losses due to long-term and short-term disability at 24.4% and 11.2% (respectively) of the total. This conservative estimate finds the indirect cost of illness to the economy to be 54.3% of the total economic burden of illness, compared to 45.7% for direct health care costs.[54]

Using that ratio, we can estimate that excess weight and obesity cost the Nova Scotia economy more than $140 million a year in productivity losses. Added to the estimated $120 million in direct health costs, it is possible to conclude that obesity costs Nova Scotians more than $250 million a year.

Needless to say, these costs of obesity-related illness do not include the actual costs of treating obesity itself, including diet pills and weight loss programs, because provincial health care systems do not fund the treatment of obesity alone. Only the illnesses resulting from obesity are therefore included in the estimate.

Dr. Colditz of the Harvard University School of Public Health has estimated that obesity costs the United States more than smoking in direct and indirect costs ($US118 billion annually, compared to $47 billion attributable to cigarette smoking).[55] However, the estimate in this study indicates that obesity costs run second to the estimated $367 million in direct and indirect costs attributable annually to smoking in the province.[56] On a per capita basis, the cost estimate of $250 million given here is about half of Colditz's estimate for the United States, despite comparable rates of obesity, and so can be considered a reasonable estimate of direct and indirect costs.

But while smoking is widely acknowledged as the most important preventable cause of death, it is far less widely known that obesity is the second most important preventable cause of death.[57] At recent rates of increase, it could soon surpass smoking to become the most costly preventable cause of death. The obesity epidemic has crept on us rapidly and almost unnoticed, and so it has not received nearly the attention that smoking has.

A different way of thinking about the cost estimates given here is simply that if all Nova Scotians had healthy weights (BMI = 20 - 24.9), the province would *save* $250 million a year, one-third of the current deficit, and an amount that could be more productively invested in activities that enhance well being. In three years, the provincial deficit could be eliminated through this one step alone. If all Nova Scotians had healthy weights *and* quit smoking, the provincial deficit could be eliminated in little over a year.

Another way of considering the value of an investment in reducing obesity is to compare it to other priorities that currently command attention. U.S. studies have estimated that between 280,000 and 300,000 Americans die prematurely each year due to obesity.[58] This study has not attempted a calculation of preventable premature deaths due to obesity for Nova Scotia. But if the U.S. ratio applied to this province, which has similar rates of obesity, then close to 1,000 Nova Scotians are dying unnecessarily each year due to overweight, and 4,000 potential years of life are being lost each year.

This compares to an average of eight deaths per year on Highway 101. If half of those deaths were preventable by twinning the highway, a generous estimate considering the many causes of highway fatalities, then the proposed $100 million plus investment proposed for that road will save about four lives each year. It is worth considering what a similar investment in nutritional literacy and physical education programs might yield in lives saved.

But money is not the only potential saving that would accrue from a reduction in the incidence of unhealthy weights. Harvard University's Dr. Colditz has estimated that among obese Americans, slimming to a healthy weight and maintaining it could prevent 96% of diabetes cases in that group, 74% of hypertension, 72% of coronary heart disease, 32% of colon cancers, and 23% of breast cancers. In other words, there is a tremendous burden of unnecessary suffering borne by overweight Nova Scotians that could be eliminated through greater attention to this serious problem.[59]

It is important to note that the cancer costs attributable to obesity in this cost estimate do not include other diet-related causes of cancer, such as lack of fibre and chemical additives to food. As noted above, only 4.7% of colorectal cancers, for example, have been attributed to obesity in this cost estimate. But obesity is clearly not an isolated determinant of health, and is clearly associated with unhealthy diets in the larger sense that carry other adverse health risks. Fast food high in fat and sugar, for example, has a range of other health impacts beyond its contribution to obesity.

Researchers at the World Cancer Research Fund and the American Institute for Cancer Research report that changes in diet alone could prevent 30% - 40% of all cancers world-wide, at least as many cases as could be prevented by a cessation of smoking. It would be an interesting exercise, yielding quite different results, to estimate the direct and indirect costs of unhealthy diets.

Risk factors for cancer, cardiovascular disease and other illnesses clearly do not exist in isolation. Atlantic Canadians not only have higher rates of obesity than other Canadians, but also register higher rates of smoking, high blood pressure and physical inactivity. Effective health promotion programs in this region that target all these risk factors together to promote healthier lifestyles can save our struggling health care systems far more than fiscal and management solutions that remain within the illness-treatment paradigm to which we are accustomed.

Table 1, for example, indicates that hypertension is the single largest cost of obesity and accounts for probably one-quarter of the total economic burden due to unhealthy weights in the province. All four Atlantic provinces register higher than average rates of high blood pressure, and Nova Scotian men and women consistently record the highest rates in the country. Seventeen percent of Nova Scotians have high blood pressure, a rate 62% higher than the Canadian average. In previous surveys, too, Nova Scotians have recorded 32%, 40% and 50% higher rates of high blood pressure than other Canadians.[60]

A particularly high percentage of Nova Scotian women record high blood pressure (more than one in five), 80% above the national average, and 43% above the next highest province (Prince Edward Island). Again, this high rate has been consistent over time. In previous surveys, in 1985, 1991, and 1994-95, the rate of high blood pressure for Nova Scotian women was 46%, 50% and 55% above the national average. While rates of high blood pressure have declined across the country, they remain stubbornly high among Nova Scotian women (Chart 7).[61]

In sum, both the potential for disease prevention and the enormous cost savings that would accrue as a result argue for a major shift in focus from the high-technology medical interventions and illness-treatment paradigm that have dominated our budgets and thinking in the past, to strategies of population health promotion that target the major determinants of health identified by Health Canada. Those determinants include income, literacy, employment status, the physical environment and healthy lifestyles.

As Dalhousie University's Dr. MacLean has argued:

> *Striking a healthy balance for our health system means reducing the demand for expensive high-technology health care -- and realistically, this can only be accomplished by reducing the burden of illness from chronic disease.*[62]

The following section suggests some potentially useful directions to explore in overcoming the obesity epidemic.

7. Causes and Remedies

This final section does not pretend to offer any comprehensive "solution" to the obesity epidemic. The relation between causes, conditions and symptoms is very complex. While obesity is presented in this study as a *determinant* of illness, it is clearly not an independent variable but itself a symptom of other underlying conditions. In order to prevent the further spread of the affliction, to reduce obesity rates and their associated health costs, and to promote better population health, these underlying conditions must be addressed.

While genetics influence body weight, they cannot account for the dramatic *increase* in rates of obesity in a very short period of time. Though this brief review does not attempt to be comprehensive, it does attempt to identify some primary social trends that clearly create a propensity to unhealthy weights. Section One above noted that these statistics will create no benefit if they simply make Nova Scotians feel bad about themselves. The sole purpose of bringing this hidden issue out of the closet is to spur positive action that can improve population health and well being.

The good news in the midst of this bleak picture is that almost all the chronic conditions caused by obesity are reversible and preventable. If we can be honest and courageous enough to identify the primary causes and conditions of the dramatic increase in obesity, Nova Scotians can certainly take the lead in turning it around. The only real obstacle is ignorance, and so the first condition for reversing the epidemic is to bring it determinedly out of the shadows and into the spotlight.

(a) Measuring Well Being

The first and most basic requirement to turn around the destructive trends identified in this study, therefore, is quite simply to count and measure our progress in doing so. We

need to keep regular track of our success in reducing obesity and increasing the proportion of Nova Scotians with healthy weights. This cannot be done by continuing to rely on economic growth statistics as our core measures of progress, because these measures will continue to send all the wrong signals to policy makers, and continue to hide the issue. We have to include population health measures explicitly in our core measures of progress.

To quote just one example from a recent article:

> *Eli Lilly & Co., the $75 billion pharmaceutical company, is now building the largest factory dedicated to the production of a single drug in industry history. That drug is insulin. Lilly's sales of insulin products totaled $357 million in the third quarter of 1999, a 24 percent increase over the previous third quarter. Almost every leading pharmaceutical conglomerate has like-minded ventures under way, with special emphasis on pill-form treatments for non-insulin-dependent forms of the disease.*
>
> *Pharmaceutical companies that are not seeking to capture some portion of the burgeoning market are bordering on fiduciary mismanagement. Said James Kappel of Eli Lilly, "You've got to be diabetes."*[63]

In other words, the five-fold global increase in adult-onset diabetes in just 13 short years, from 30 million in 1985 to 143 million in 1998, is *good* for the economy. It provides jobs and spurs economic growth. With the global incidence of diabetes expected to double to 300 million by the year 2025, insulin is clearly a "growth market" for the pharmaceutical industry.[64] Like war, crime and pollution, illness makes the economy grow more rapidly than peace, health and a clean environment.

So long as the spread of obesity is good news for the GDP, and so long as we continue to measure our prosperity, progress and well being almost exclusively by that measure, we are not likely to elevate population health measures to the status they clearly deserve. Correspondingly, the policy arena will remain fixated on short-term economic stimulus rather than long-term health promotion, which will continue to be seen as a "cost" in our health budgets, rather than as the "investment" it really is.

Nor will we ever address the underlying causes of the obesity epidemic, but tend instead towards short-term quick-fix solutions that further stimulate the economy. In the rich countries, liposuction and olestra attract more attention than poor eating habits and sedentary lifestyles. Liposuction is today the leading form of cosmetic surgery in the United States, with 400,000 operations a year contributing mightily to that country's GDP.[65] We have already noted that the diet and weight loss industries contribute another $33 billion to the U.S. economy annually.

The food industry contributes another $30 billion in advertising to the U.S. GDP, more than any other industry, and much of it promotes the very foods that cause obesity. A 1996 Consumers International Study found that the fast food industry accounts for one-third of food advertising expenditures in the industrialized countries. When candy and

sweetened breakfast cereals are included, the advertising expenditures account for more than half of all food advertising in the USA, Australia and eleven European countries. Kelloggs spends $40 million a year to promote Frosted Flakes alone.[66]

Coca Cola and MacDonalds are two of the top ten advertising spenders in the world among all industries. Four out of the five new MacDonalds restaurants that open daily are outside the United States, stimulating not only U.S. business but the GDPs of virtually every other country in the world as well.[67] By contrast, nutritional education budgets are insignificant, and register as "costs" to be cut in ever tighter government budgets.

While we adhere to these perverse accounting methods to measure our well being as a society, we will continue to ensure that our children get their food education from the fast food industry rather than from their teachers. Like tobacco companies, food companies explicitly target children to nurture addictions that will last into adulthood. It is perhaps no coincidence that the last ten years have seen a massive expansion of tobacco interests like Philip Morris and RJR-Reynolds into the food industry, with estimates that one-third of processed and packaged food on supermarket shelves is today marketed by these companies.

Since their health impacts are comparable, it may not be unreasonable to take a similar attitude towards the marketing of toxic foods as to the marketing of tobacco products. If we begin to include valuations of health determinants in our core measures of progress, rather than the size of advertising budgets, then the gradual displacement of these unhealthy foods by more nutritious ones will be counted as a sign of increasing well being and improved population health.

In sum, the first and most basic step to turn around the alarming trend towards unhealthy weights is simply to measure our efforts in doing so explicitly and regularly, and thus to assess whether the methods we have employed are working. The sooner we abandon the misuse of the GDP as a measure of progress and well being, and include population health in our core measures of progress, the sooner we will get the policy commitments we need to make healthy weights a top priority in improving the health of Nova Scotians.

(b) Promoting Healthy Diets and Nutritional Literacy

As noted above, it is estimated that 30-40% of cancers worldwide could be prevented by switching to healthy diets. Obesity is only one consequence of a reliance on nutrient-poor high-fat, high-sugar diets, with low fibre and chemical additives also implicated in cancers of the breast, colon, mouth, stomach, pancreas, and prostate.

Unfortunately, much of the fats, oils, sugars and salt in our diets are added to processed and prepared foods without our active participation. A 1909 study found that two-thirds of discretionary sugar was added in the household. Today more than three-quarters of the sugar we consume is added to processed and prepared food, out of sight of the consumer.[68]

In North America and Europe, fat and sugar today comprise more than half the average caloric intake, squeezing complex carbohydrates to just one-third of total calories. Whole grains have largely been replaced by refined grains stripped of their vitamin and mineral content. Only 2% of wheat flour eaten in North America today is unrefined. One-fifth of the "vegetables" Americans eat are french fries and potato chips. A single fast food meal will frequently exceed the recommended *daily* guidelines for fat, sugar, cholesterol and sodium.[69]

While it is widely known today that low-fat, low-sugar diets with ample whole grains, fruits and vegetables are the basis of a healthy diet, there is still widespread ignorance about the processed and prepared foods that constitute an increasing share of our diets. Both the 1990 Nova Scotia Nutrition Survey and a 1992 National Institute of Nutrition study found that food labels were widely misunderstood and misinterpreted, with little comprehension of ingredient lists and nutrition panels, and widespread confusion about the validity of food claims on labels.[70]

The confusion applies to quantity as well as quality, with little understanding of the health impact of fast food marketing trends. A widespread current marketing trend in the United States is to "supersize" helpings of french fries, popcorn and soda at fast food establishments, on items where the ingredients cost little to the purveyor. For an extra 79 cents, a child ordering a cheeseburger, small fries, and a small Coke will today receive the same cheeseburger plus a "supersize" Coke (42 fluid ounces instead of 16 with free refills) and a "supersize" order of french fries (more than double the weight of a regular order,) increasing the caloric content of the meal from 680 calories to more than 1,340 calories of nutrient-poor, fat-rich food. [71]

Can any society determined to reverse a serious obesity epidemic that is causing tremendous suffering and costly health problems, afford to treat this type of advertising any differently from tobacco advertising? Can any society intent on improving population health afford *not* to counter this advertising with a determined nutritional education campaign no less resourceful than that devoted to countering cigarette smoking?

Is it time to consider mandated warnings on food packages no less explicit and graphic than those proposed for cigarette packages? -- "WARNING - HIGH SATURATED FAT CONTENT: CONSUMING THIS FOOD CAN LEAD TO HEART ATTACK, CANCER, DIABETES AND EARLY DEATH," accompanied perhaps by a graphic illustration. Is it time, in short, to begin looking the obesity epidemic in the face and to call a spade a spade? After all, such a health warning is backed by as much medical and clinical evidence as that linking tobacco and poor health.

Are we possibly approaching a time when governments will consider launching billion dollar lawsuits against the purveyors of toxic foods to recover preventable health care costs, just as they are now doing against the tobacco companies? (Interestingly, such lawsuits might be against the same companies.)

We may not be ready as a society for such determined political action or regulation of the food industry, especially not as long as we rely on economic growth measures to assess our progress. But at the very least, there is a strong case for better and more widespread nutritional guidance and education by schools and government agencies. It was noted in section 4 above that obesity rates are inversely proportional to educational attainment. A commitment to nutritional literacy can play a major role in reversing the obesity epidemic.

A few simple steps could go a long way. For example:

- Teachers can be trained to read and explain nutritional labels in class, including the health consequences of different ingredients, and perhaps to take students on guided tours of supermarkets for the same purpose. Students could be explicitly taught to cook and taste healthy foods, and to critique food additives intelligently. A concerted nutrition education program in Singapore schools, the "Trim and Fit Scheme" reduced obesity rates among that country's school children by 33% to 50% depending on the age group.[72]

- Similarly, doctors, nurses and other health care providers can be given more explicit diet and nutritional training to pass on to their clients. Rather than simply treating the consequences of poor nutrition, they can be better trained to emphasize the links between diet and health that can promote healthy living. One study found that only 23% of medical schools in the United States currently require a separate nutrition course.[73]

- Schools, universities and hospitals frequently contract with fast food companies to open franchises on campus, and are often guided by budget considerations alone in contracting out cafeteria licenses. Instead, health and education establishments in particular might make an effort to award food service contracts based on food quality and nutritional content.

  It is questionable whether classroom teaching and healthy diet literature will have much impact if our places of learning and healing send the opposite message in their own operations. But there is tremendous opportunity for positive learning here. Schools are places where children gather, where meals are served, and where eating habits are formed. Establishing nutritional guidelines for food contracts is a simple step that can be taken by local school boards, universities and hospitals without waiting for government to act.

- Schools in Berkeley, California, have set up vegetable gardens to teach students about food and nutrition, and even to supply food to the school cafeterias. Beginning in 1999, Berkeley schools were required to serve organic lunches. This is an action that local authorities can take any time.[74]

- A U.S. experiment promoting better nutrition and physical activity in grade 3-5 children, the "Child and Adolescent Trial for Cardiovascular Health," found

substantially lower dietary fact intake and higher levels of physical activity well into the adolescent years compared to control groups, indicating that behavioural changes at a young age can have lasting effects.

- At a more ambitious level, the government of Finland in the 1970s and 1980s embarked on a concerted campaign to reduce that country's high rate of cardiovascular disease, partly through improving nutrition. A national nutrition media campaign, new dietary guidelines, strict food labeling requirements and other nutritional education initiatives are credited for half the 65% drop in mortality from heart disease in that country between 1970 and 1995. Like a milder form of the fictional food warning label described above, Finland already requires high-salt processed foods to carry a clear warning label -- "heavily salted."[75]

- In the longer term, positive actions that encourage market responses to demands for better nutrition may be more likely to yield healthy outcomes than heavy-handed regulation. One of the most innovative schemes is that proposed by Yale University professor Kelly Brownell, for a tax on foods inversely proportional to nutrient value per calorie -- a measurable quantity that can act as a clear guideline for tax programs. Simply put, fatty, sugary foods poor in nutrients and high in calories would be taxed at the highest rate, while fruits, vegetables and whole grains would be exempt from taxation.[76] The taxation revenues could be dedicated to nutritional education and physical education programs, just as a portion of cigarette taxes and gambling revenues fund anti-smoking campaigns and problem gambler counseling.

The parallels with smoking and gambling are appropriate. From the perspective of the Genuine Progress Index, which uses "full-cost accounting" methods, it is simply a matter of making toxic substances and activities with societal liabilities ***pay their full costs***. Since taxpayers absorb the health care costs of cigarette smoking, obesity, and diet-related cancers, then any efficient "user-pay" system will incorporate these costs into market prices rather than passing them on in hidden form to the general public.

Such market incentives for healthy foods can have a direct impact on another major determinant of health -- poverty. It has been noted that obesity is correlated with low income, a trend that is not likely to change while poor-nutrient fast foods are cheaper than higher quality healthy foods. The 1994-95 National Population Health Survey found that low-income Canadians were more likely to express concerns about the cost of low-fat foods than were high-income Canadians. Forty percent of those with low incomes believe that low-fat products are expensive, and 27% believe that grain products are expensive, compared with 32% and 8% respectively of those with high incomes (Chart 8).

In a sense all these measures flow naturally from adopting a set of measures of progress that place direct and explicit value on population health. Financial incentives and tax penalties are the primary tools at the disposal of governments to influence behaviour. While we may be a long way from such concerted government action in Nova Scotia, local communities, school boards, hospitals and other authorities can lead the way in effecting the major change in attitudes towards food and diet that are necessary to

overcome the obesity epidemic that afflicts our population. The crisis in our health care system, and the recognition of the very high financial costs of obesity to Nova Scotia, may well provide the impetus for the necessary change.

(c) Physical Activity

The most comprehensive review of the health impacts of physical activity ever conducted is contained in the Report of the U.S. Surgeon-General, *Physical Activity and Health,*1996. The study cites several comprehensive review articles on the impact of exercise training and physical activity on body weight and obesity, which conclude:

1) *Physical activity generally affects body composition and weight favorably by promoting fat loss while preserving or increasing lean mass;*
2) *The rate of weight loss is positively related, in a dose-response manner, to the frequency and duration of the physical activity session as well as to the duration (e.g. months, years) of the physical activity program; and*
3) *Although the rate of weight loss resulting from increased physical activity without caloric restriction is relatively slow, the combination of increased physical activity and dieting appears to be more effective for long-term weight regulation than is dieting alone;*
4) *Independent of its effect on body weight and total adiposity, physical activity may favorably affect fat distribution.*[77]

Fifteen years ago Maritimers were more physically active than most Canadians, exercising more frequently in their leisure time. Today all four Atlantic provinces rank significantly *below* the Canadian average (Chart 9). This is a disturbing trend, as physical inactivity has been clearly identified as a primary risk factor in cardiovascular disease.

Sedentary Canadians have a 44% higher rate of obesity than physically active Canadians, so the two issues are clearly linked.[78] A recent Statistics Canada analysis controlling for age, education, income, smoking, blood pressure, weight, and other factors, found that sedentary Canadians have *five times* the risk of developing heart disease as those who exercise moderately in their free time. Sedentary Canadians are 60% more likely to suffer from depression than those who are active, and Statistics Canada concluded that "physical activity has protective effects on heart health and mental health that are independent of many other risk factors."[79]

Current trends not only portend a poorer health prognosis for Atlantic Canadians compared to the national average, but will also increase health care costs in the long run. Cardiovascular disease costs Canadians more than $20 billion a year in direct and indirect costs, 15% of the total cost of all illnesses, and is the largest cost among all diagnostic categories.[80] Diseases of the circulatory system accounted for more hospital days than any other illness, 6.3 billion days in 1996, and taxpayers paid more than $5 billion in hospital costs for cardiovascular disease.[81]

The overall population averages conceal sharply divergent trends among men and women, and indicate clearly that urgent action is required to stem a dramatic decline in physical activity among men in the Atlantic provinces. In fact, women have generally *increased* their rates of leisure time physical activity quite dramatically since 1985, by 24% in Newfoundland, 15% in Nova Scotia, and 8% in New Brunswick. Overall this is a good prognosis for women's health in this region.

By contrast, while more Canadian men than ever are exercising in other parts of the country, more Atlantic region males are becoming sedentary. In all four Atlantic provinces, men are entirely responsible for this negative population health trend as a whole. Fully six out of ten Atlantic region men are physically inactive in their free time, with declines in male activity rates of 36% in PEI, 18% in New Brunswick, 13% in Nova Scotia, and 4% in Newfoundland. Fifteen years ago, in every Atlantic province, more men than women exercised on a regular basis, by a significant margin. Today, in every province, more women exercise than men.

In the long term, this means that while Atlantic Canadian men had a relatively lower risk of heart disease in 1985 compared to other Canadians, they now have a significantly higher risk, the costs of which will gradually become evident over time. The evidence strongly suggests, therefore, that health officials target men in promoting sports and exercise programs.

The high rates of physical inactivity are matched by high rates of television viewing in the province. The 1998 time use survey indicated that Nova Scotians watch an average of two and half hours of television a day, the highest rate in the country, not counting the time when the TV is turned on and they are doing other activities such as eating (Chart 15).[82] When the latter is included, a separate Statistics Canada survey on television viewing indicated that Nova Scotians watch three and a half hours of television a day.[83] Nova Scotians watch an average of half an hour more TV each day than other Canadians. This amounts to 180 hours more per year, the equivalent of a full month of 40-hour days.

The American Academy of Pediatrics recently reported that "increased television use is documented to be a significant factor leading to obesity,"[84] and may help explain why 25% of U.S. children today are overweight or obese. Another study, published in the Journal of the American Medical Association, found that children lost weight if they simply watched less television.[85]

Recommendation: A teacher at the former Tower Road School in Halifax conducted a very revealing experiment with her class. She made a pact with the students not to watch television for a full week, and asked them to keep a journal of what they did in the extra time. After a couple of nervous days in which the children did not know what to do with their time, they became acutely conscious of just *how much* time they actually spent watching TV. In the next days, however, they began to enjoy walks with their families, to

play in the park, and engage in higher levels of physical activity that became increasingly enjoyable to them as the week progressed. It is an experiment worth replicating on a wider scale throughout the province. Again, teachers can act without waiting for the government or any higher authority.

(d) Stress and Work Patterns

While diet and physical activity are strongly related to healthy weights, these lifestyle choices are themselves dependent variables. In other words, the chain of cause and effect continues to deeper levels, and provokes profound questions as to what societal trends may underlie the poor eating habits and high levels of physical inactivity that in turn reinforce the propensity to unhealthy weights. Poor dietary habits have been linked to high stress, which in turn is determined in part by changing work and time use patterns.

Stress levels are assessed in population health surveys by a battery of questions, from which "chronic stress" indices are derived. The data show that Nova Scotians are experiencing higher stress levels in exactly the same period that rates of obesity have doubled. The potential connection is worthy of further exploration.

Nova Scotian stress rates have gone up in relation to the rest of the country as well, though the causes of this more rapid increase have not been studied. In 1985, 14% fewer Nova Scotians reported high stress levels than other Canadians. By 1991, just 4% fewer Nova Scotians were highly stressed; and by 1994-95, *more* Nova Scotians were chronically stressed than other Canadians. In the same year, 18% more Nova Scotians reported low levels of psychological well being than other Canadians.[86]

This disturbing pattern may be related to an increase in unhealthy lifestyles. Statistics Canada reports that the proportion of "severely time-stressed" youth, age 15-24, increased by 25% between 1992 and 1998, to 22% among young women and 10% among young men.[87] During the same period, teenage smoking rates increased from 26% in 1991 to 38% among young women and 34% among young men.[88] In sum, rising stress levels, and increased rates of smoking and obesity in the province are all documented. At this stage, the connections are circumstantial, but certainly worth exploring.

The increase in chronic stress appears related to changing employment patterns. Seventy percent of families are now dual-earners, and the combined burden of paid and unpaid work time is increasing across the country. Nova Scotian women have doubled their share of participation in the paid labour force from 27% forty years ago to 54% today. Working mothers now put in an average 74-hour week of paid and unpaid work, and working parents have an increasingly difficult time juggling the combined pressures of job and household responsibilities (Charts 12, 13, 14). Not surprisingly, Statistics Canada ranks 38% of working mothers as "severely time stressed" based on a 10-question time stress survey.[89]

The time use surveys show clearly that work pressures have increasingly squeezed out time that was once spent cooking and preparing food at home, and lent impetus to the spread of fast food restaurants. Chart 10 presents data from Statistics Canada's time use surveys showing a dramatic decline in time spent cooking, preparing meals and washing dishes. Nova Scotians spent two hours less per week in their kitchens in 1998 than in 1992, a decline of 30% in just six years. At the same time, the proportion of the average household food budget spent eating out has steadily increased (Chart 11). It is likely that healthy diets have suffered in the transition from home cooking to greater reliance on prepared fast food.

Again, though increasing time stress is a trend across the country, some European countries have demonstrated viable alternatives to the current North American tendency to work longer hours. The Netherlands, for example, has reduced its unemployment rate from 12.2% to 2.7% by reducing and redistributing work hours, to allow workers to balance their job and household responsibilities more successfully. The Dutch now have the shortest work hours of any industrial country -- 1,370 hours a year, compared to 1,732 hours in Canada. International time use surveys indicate that Danish citizens have an average of 11 hours more free time each week than Canadians.

A recent Statistics Canada study found that women working longer hours were 40% more likely to decrease their level of physical activity and 2.2 times more likely to experience major depressive episodes than women working standard or short hours. Women with high levels of job strain were 1.8 times more likely to experience an unhealthy weight gain compared to women with low job strain; while women who reduced their work hours had only half the odds of a weight gain compared to those who continued to work standard hours.[90]

These findings are very significant in understanding the relation between long work hours and the rise in rates of obesity. They are the first direct evidence in Canada linking work stress and long work hours with weight gain. While the mechanisms linking the two factors are not yet well understood, it is likely both that meal preparation time is getting squeezed out and replaced with unhealthier fast food, and that the stress itself may produce more nervous snacking.

In short, healthy diets and healthy weights may depend on an honest reexamination of our work culture, and on ways of balancing job and household responsibilities more effectively. Despite the massive influx of women into the paid workforce, work arrangements have hardly changed from the era of single-earner families. There is a clear need for family-friendly work arrangements that accommodate the needs of two-earner households.

(e) The Potential for Change

This very brief review of some possible determinants of obesity is far from comprehensive, and indicates how much more knowledge is required to counter the

costly increase in obesity. The issue has been so long in the shadows that far less research effort has gone into understanding these vital determinants of health than in dealing with their health consequences when disease has already developed.

It is clear, however, that deep societal trends have had a powerful influence on the dramatic increase in obesity. It is necessary to emphasize again that the purpose of this study is not to make overweight individuals feel worse about themselves or even more self-conscious than before, nor to make Nova Scotians feel they are worse than other Canadians. Instead, the emphasis here is on unearthing the social trends that have contributed to a global epidemic in order that a clearer understanding can help turn around this destructive and costly trend. There is no reason that Nova Scotians cannot be at the forefront of this urgent effort.

The current reality, sadly, is that as obesity rates have gone up, population health surveys show that the percentage of Nova Scotians desiring a change in their weight has dropped (Chart 16). It is the view of this author that these results do not portend an inability to effect change, but are the consequence of lack of knowledge. Not only have obesity trends themselves been hidden, but the cost of their health consequences has not been acknowledged either in human or in financial terms.

If we can begin to spotlight the issue of obesity and its costs in the same way that tobacco has been identified as the single most preventable cause of death and illness, then action to counter the obesity epidemic will follow. Nutritional and physical education programs and healthy diet initiatives by schools, potential government action, and other recommendations in this section are as feasible and practical as the campaign against tobacco.

The good news is that obesity is as reversible as its sudden spread. The serious disease consequences of obesity are preventable, and the huge savings that will result can be invested in more constructive action to improve well being and prosperity. It is the hope of GPI Atlantic that this conference will be a first step in a province-wide campaign for healthy weights that will join educators, health practitioners, food purveyors, government, community organizations, and ordinary citizens in a common endeavour.

Endnotes

[1] Nova Scotia Heart Health Program, *Report of the Nova Scotia Nutrition Survey,* March, 1993, page 32, citing also: D. Reid, "The Nutrition Label Maze, " *Rapport,* 1992, 7 (3), pages 1-6.
[2] World Health Organization, *Obesity: Preventing and Managing the Global Epidemic,* Report of a World Health Organization Consultation on Obesity, Geneva, 1997, cited in Gary Gardner and Brian Halweil, "Nourishing the Underfed and Overfed," chapter 4 in Worldwatch Institute, *State of the World 2000,* W.W. norton and Co., New York, 2000, page 6.
[3] Federal, Provincial and Territorial Advisory Committee on Population Health (hereafter: ACPH), *Statistical Report on the Health of Canadians,* Health Canada, September, 1999, pages 264-265.
[4] American Cancer Society report published in *New England Journal of Medicine,* October, 1999, and cited in the *Halifax Chronicle-Herald,* October 9, 1999, page C1, based on longitudinal research on participants in the U.S. national Cancer Prevention Study from 1982 to 1996.
[5] See for example, C. Laird Birmingham, M.D. et. al., *Canadian Medical Association Journal,* 23 February, 1999: 160 (4), page 484.
[6] Department of National Health and Welfare, Health Services and Promotion Branch, *Canadian Guidelines for Healthy Weights,* Ottawa, 1988.
[7] World Health Organization, *Physical Status: The Use and Interpretation of Anthropometry, Report of the WHO Expert Committee,* WHO Technical Report Series, No. 854, Geneva, 1995; Expert Panel of the National Institutes of Health, "Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults: Executive Summary," *American Journal of Clinical Nutrition,* 1998; 68 (4), pages 899-917; both sources cited in Jason Gilmore, "Body Mass Index and Health," *Health Reports,* Statistics Canada, catalogue no. 82-003, volume 11, no. 1, Summer, 1999, pages 33 and 42.
[8] Gilmore, op. Cit., page 35; J. Cairney, et. al., "Correlates of Body Weight in the 1994 National Population Health Survey, *International Journal of Obesity,* 1998; 22, pages 584-591; R.J. Roberts, "Can Self-Reported Data Accurately Describe the Prevalence of Overweight?", *Public Health,* 1995, 109 (4), pages 275-284; A. Hill and J. Roberts, "Body Mass Index: A Comparison Between Self-Reported and Measured Height and Weight," *Journal of Public Health Medicine,* 1998, 20 (2), pages 206-210.
[9] Birmingham, op. cit., (see footnote 3 above).
[10] Cited in the *Halifax Chronicle-Herald,* October 9, 1999, page C1
[11] ACPH, page 264.
[12] Federal, Provincial and Territorial Advisory Committee on Population Health, *Toward a Healthy Future: Second Report on the Health of Canadians,* Health Canada, September, 1999, page 117 (hereafter: *Second Report).*
[13] Gilmore, op. cit., pages 31-43
[14] Birmingham, op. cit., pages 485-486.
[15] Studies cited in Gary Gardner and Brian Halweil, "Nourishing the Underfed and Overfed," chapter 4 in Worldwatch Institute, *State of the World 2000,* page 72.
[16] Greg Critser, "Let Them Eat Fat: The Heavy Truths About American Obesity," *Harper's Magazine,* March 2000, pages 43-44.
[17] Study by Dr. Aviva Must and Dr. William Dietz published in the *New England Journal of Medicine,* 5 November, 1992, cited in the *Halifax Chronicle-Herald,* 5 November, 1992, page D8.
[18] Greg Critser, op. cit., *Harper's Magazine,* , March 2000, pages 43-44.
[19] GPI Atlantic is grateful to Ms. Deirdre Gilleison, analyst, Health Statistics division, Statistics Canada, for her invaluable advice and assistance with this section, and particularly in identifying the appropriate population denominators for different surveys on Body Mass Index in order to allow comparative trend analysis over time. Ms Gilleison kindly provided special data runs both for the 1994-95 National Population Health Survey (NPHS) results on BMI, and also mid-year population estimates for the 20-64 year-old population to match the NPHS June-June survey period. Note that for convenience "1997" is listed both in this section and in the accompanying charts as the comparison date. Strictly speaking, the NPHS results should be listed as "1996-97".

[20] Statistics Canada, *Health Indicators,* CD-Rom, 1999, Table 00060211.IVT: "Population by Body Mass Index". It should be noted that this database gives lower overweight rates for 1985 than the *Second Report on the Health of Canadians,* which gives overweight rates (BMI = > 27) of 22% for Canadian men and 14% for Canadian women. This report uses the figures in the Statistics Canada CD-Rom *Health Indicators* database for two reasons: 1) It was released more recently (2000) than the *Second Report* (1999); and 2) It gives the figures for 1985, 1990, 1994-95 and 1996-97 in one table, indicating adjustments for comparability that take into account the different populations sampled in the different surveys.
[21] ACPH, *Statistical Report,* pages 264 and 267; Gilmore, op. cit., page 33
[22] Idem: See footnotes above.
[23] *Second Report,* page 118; *Health Indicators,* Table 00060211.IVT.
[24] *Health Indicators,* op. cit.
[25] ACPH, page 267.
[26] Heart and Stroke Foundation of Canada, *The Changing Face of Heart Disease and Stroke in Canada 2000,* October, 1999, Wielgosz statistics cited in the *Halifax Chronicle-Herald,* October 22, 1999, page A9.
[27] World Health Organization, *Obesity: Preventing and Managing the Global Epidemic,* Report of a WHO Consultation on Obesity, Geneva, 1997.
[28] Michel Montignac, in The *Halifax Chronicle-Herald,* March 28, 2000, page A10.
[29] Gary Gardner and Brian Halweil, *Underfed and Overfed: The Global Epidemic of Malnutrition,* Worldwatch Paper # 150, Worldwatch Institute, Washington, D.C., 2000.
[30] Gary Gardner and Brian Halweil, "Nourishing the Underfed and Overfed," chapter 4 in Worldwatch Institute, *State of the World 2000,* W.W. Norton and Co., New York, 2000, page 60.
[31] Op. cit., page 62.
[32] "Chronic Hunger and Obesity Epidemic Eroding Global Progress," Worldwatch press release for Gardner and Halweil, *Underfed and Overfed,* Worldwatch Paper #150.
[33] Gardner and Halweil, Ch. 4, *State of the World 2000,* pages 63, 70 and 71.
[34] C. Laird Birmingham, M.D. et. al., *Canadian Medical Association Journal,* 23 February, 1999: 160 (4), page 486.
[35] Gardner and Halweil, Ch. 4, *State of the World 2000,* page 72.
[36] David Suzuki, address at Mt. St. Vincent University, Halifax, N.S., October, 1998.
[37] David MacLean, M.D., "Striking Balance Between Care, Costs," The *Halifax Chronicle-Herald,* January 20, 2000, page C2.
[38] Birmingham, op. cit., page 484
[39] idem., and see footnotes sources on page 488 for studies demonstrating these linkages.
[40] Op. cit., page 488.
[41] David MacLean, op. cit., page C2
[42] Gardner and Halweil, *State of the World 2000,* page 73.
[43] Birmingham, op. cit., page 487, citing J. Gorstein and R.N. Grosse, "The Indirect Costs of Obesity to Society," *Pharmoeconomics,* 1994, 5, pages 58-61; Gardner and Halweil, op. cit., page 73.
[44] Gardner and Halweil, op. cit., pages 73-74.
[45] Birmingham, op. cit., pages 484-486.
[46] Health Canada, *Economic Burden of Illness in Canada, 1993,* catalogue no. H21-136/1993E, Canadian Public Health Association, 1997; available electronically at http://www.hwc.ca/hpb/lcdc/publicat/burden/index.html
[47] ACPH, *Statistical Report,* page 270.
[48] Estimate based on Birmingham, op. cit., page 487.
[49] Idem.
[50] ACPH, *Statistical Report,* page 264.
[51] The *Halifax Chronicle-Herald,* October 9, 1999, page C1.
[52] Cited in Birmingham, op. cit., pages 486 and 488, and in Gardner and Halweil, op. cit., page 73.
[53] Birmingham, op. cit., page 487.
[54] *Economic Burden of Illness in Canada,* page 9.
[55] Cited in Gardner and Halweil, *State of the World 2000,* page 73
[56] Eric Single, et. al, *The Costs of Substance Abuse in Canada,* Canadian Centre on Substance Abuse, Ottawa, 1995, page 69 and Table 12. These references indicate that Nova Scotia has the highest per capita cost related to tobacco in the country ($398) compared to the national average of $336.

[57] ACPH, *Statistical Report,* page 164.
[58] Birmingham, op. cit., Gardner and Halweil, op. cit., Critser, op. cit.
[59] Gardner and Halweil, op. cit., page 71.
[60] Statistics Canada, *Health Indicators,* CD-Rom, 1999, Table 00060121.IVT
[61] Idem.
[62] David MacLean, M.D., The *Halifax Chronicle-Herald,* January 20, 2000, page C2.
[63] Greg Critser, op. cit., *Harper's Magazine,* March 2000, page 44.
[64] Gardner and Halweil, Ch. 4, *State of the World 2000,* page 72.
[65] Gardner and Halweil, *Underfed and Overfed: The Global Epidemic of Malnutrition,* Worldwatch Paper # 150, Worldwatch Institute, Washington, D.C., 2000.
[66] Gardner and Halweil, Ch. 4, op. cit., pages 67-68.
[67] Idem.
[68] Idem.
[69] Gardner and Halweil, op, cit., page 63.
[70] Nova Scotia Heart Health Program, *Report of the Nova Scotia Nutrition Survey,* March 1993, page 32.
[71] Critser, op. cit, *Harpers Magazine,* March 2000, page 43.
[72] Gardner and Halweil, op. cit., pages 76-78
[73] Idem.
[74] Idem.
[75] Idem.
[76] Idem.
[77] U.S. Department of Health and Human Services, *Physical Activity and Health: A Report of the Surgeon-General,* Atlanta, GA., 1996, page 134.
[78] Gilmore, op. cit., page 35.
[79] Jiajian Chen and Wayne J. Millar, "Health Effects of Physical Activity," Statistics Canada, *Health Reports*, volume 11, no. 1, Summer, 1999, catalogue no. 82-003-XPB, pages 21-30, esp. Table 1, page 24. The statistics presented here refer to regular physical activity at a moderate level of energy expenditure, which is calculated in the National Population Health Survey as total kilocalories expended per kilogram of body weight per day (kcal/kg/day or KKD). Energy expenditure of 1.5 to 2.9 KKD is considered "medium" energy expenditure; 3 or more KKD is "high" and less than 1.5 KKD is "low." "Regular" physical activity is at least 15 minutes of leisure time physical activity 12 or more times per month. (*Health Reports,* 11,1, page 23). The Statistics Canada analysis cited here found that those with a low level of regular physical activity had 3.7 times the odds of developing heart disease as those who exercised moderately (*ibid.*,page 24). For that reason the statistics cited refer to those expending 1.5 ore more KKD regularly, and the phrase "physical inactivity" includes those with low energy expenditure in their free time. On the mental health benefits of physical activity, see Sport Information Resource Centre, *Physical Activity and Mental Health,* SportBiblio 6, Gloucester, Ont., 1990.
[80] Heart and Stroke Foundation, Health Canada, Statistics Canada, *The Changing Face of Heart Disease and Stroke in Canada 2000,* pages 61-62: "Cost of Cardiovascular Disease," Heart and Stroke Foundation, Ottawa, 1999.
[81] Canadian Institute for Health Information, *Hospital Morbidity Database, 1995-96,* cited in ACPH, *Toward a Healthy Future,* exhibit 6.4, page 142 on hospital days; and *The Changing Face of Heart Disease,* Table 2-2, page 62, adjusted to 1996 dollars, on hospital costs for cardiovascular disease.
[82] Statistics Canada, *General Social Survey: Overview of the Time Use of Canadians in 1998,* Tbale 1: Canada, regions and provinces, special tabulation, November, 1999.
[83] Statistics Canada, *Television Viewing 1992,* catalogue no. 87-208, page 21
[84] "Media Education," *Pediatrics,* volume 104, no. 2, August 1999, pages 341-343, available at www.aap.org/policy/RE9911.html
[85] Thomas N.Robinson, "Reducing Children's Television Viewing to Prevent Obesity; A Randomized Controlled Trial," *Journal of the American Medical Association,* volume 282, no. 16, October 27, 1999, pages 1530-1538.
[86] ACPH, *Statistical Report,* page 51, Statistics Canada, *Health Indicators,* Tables 00060139 and 00060150.
[87] Respondents classified as "severely time stressed" by Statistics Canada are those that give affirmative answers to seven out of ten questions on a time stress questionnaire that includes questions like "Do you

consider yourself a workaholic?", "Do you worry that you don't spend enough time with your family and friends?", and "Do you feel that you're constantly under stress trying to accomplish more than you can handle?"
1992 results from Statistics Canada, *As Time Goes By...Time Use of Canadians,* General Social Survey, by Judith Frederick, catalogue no. 89-544E, pages 15-16;
1998 results from Statistics Canada, *The Daily,* November 9, 1999, catalogue no. 11-001E, pages 2-4; and Statistics Canada, General Social Survey, Cycle 12, 1998, Housing, Family and Social Statistics Division, special tabulation.

[88] Province of Nova Scotia, *Nova Scotia Student Drug Use, 1998; Highlights Report* and *Technical Report,* Halifax, Nova Scotia Department of Health, Drug Dependency, Dalhousie University, Communications Nova Scotia, 1998; Federal, Provincial and Territorial Advisory Committee on Population Health (ACPH), *Toward a Healthy Future: Second Report on the Health of Canadians,* Health Canada and Statistics Canada, September, 1999, pages 119-123.

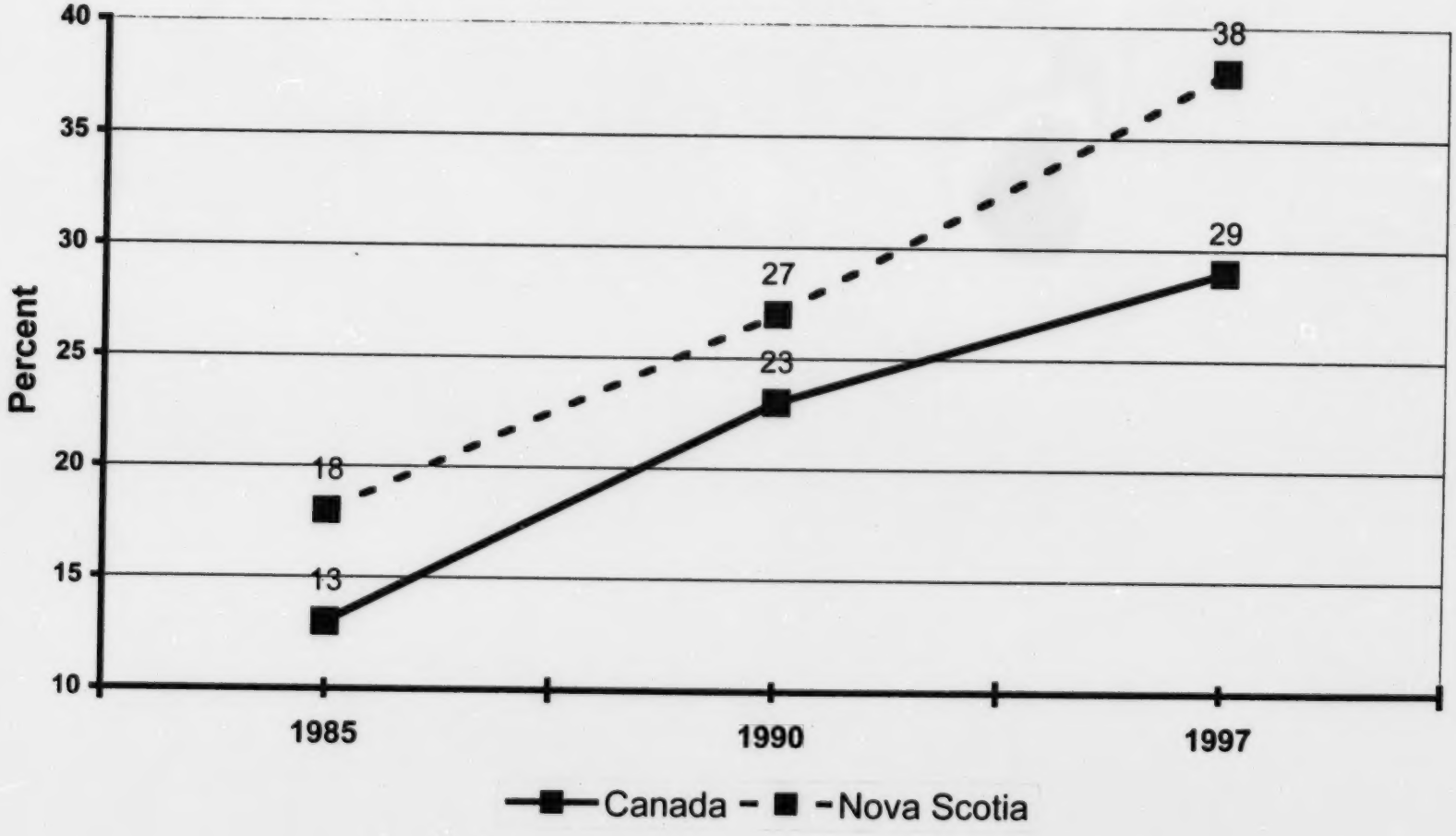
[89] For details, see GPI Atlantic, *Women's Health in Atlantic Canada: A Statistical Portrait,* Halifax, February, 2000, Maritime Centre of Excellence for Women's Health.

[90] Margot Shields, "Long Working Hours and Health," Statistics Canada, *Health Reports,* volume 11, no. 2, autumn 1999, pages 33-48.

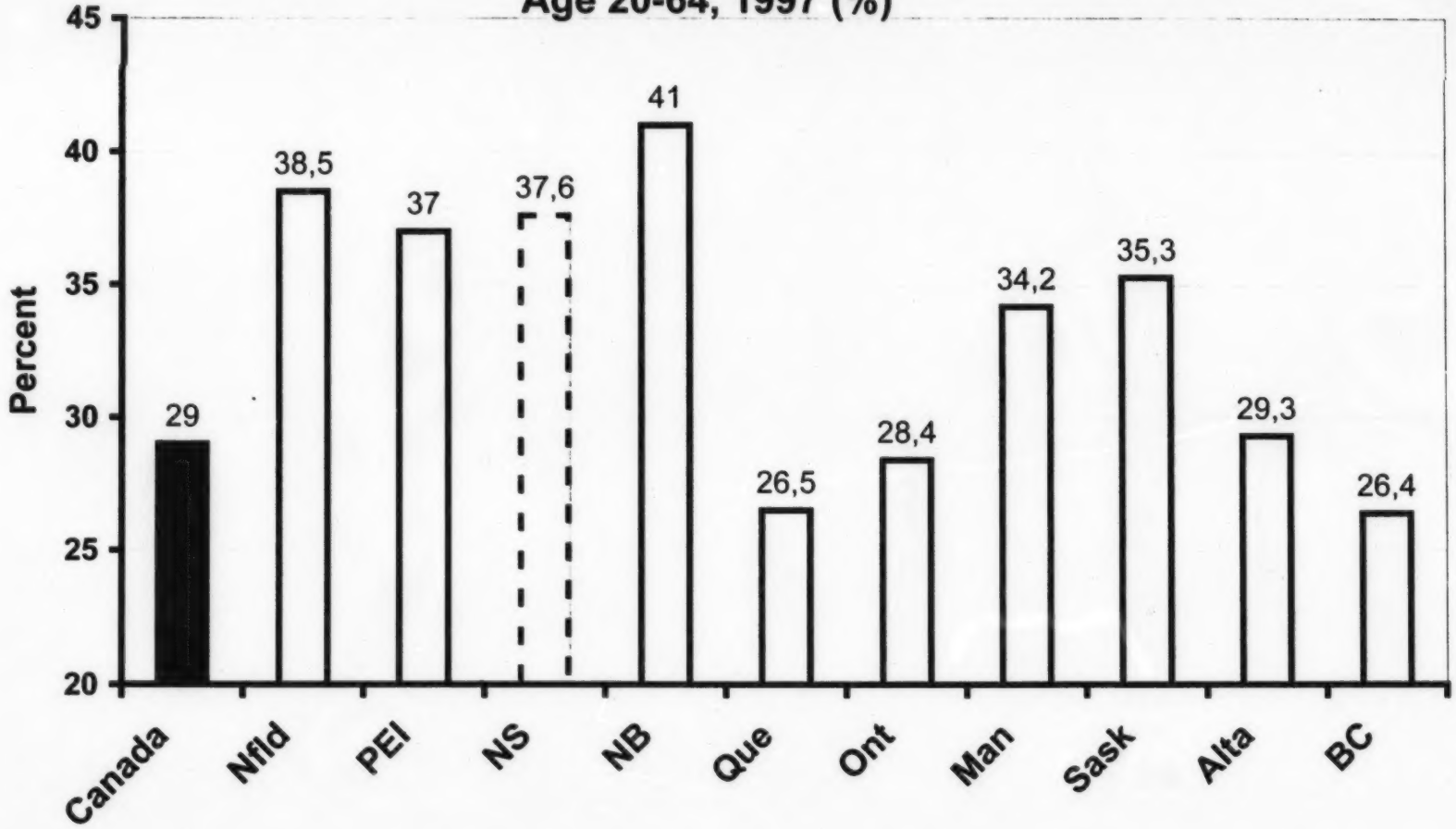
Table 1: (a) Relative Risks for Selected Comorbidities in Obese Subjects
(b) Population Attributable Fraction for Obesity in Nova Scotia
(c) Direct Health Care Costs Attributable to Obesity for Each Illness, Nova Scotia, 1997

Comorbidity	Relative Risk	PAF (%) N.S.	Cost Attributable to Obesity (1997 $), N.S.
Hypertension	2.51	36.5	24,267,711
Type 2 diabetes	4.37	56.2	15,010,255
Coronary artery disease	1.72	21.5	13,297,092
Gallbladder disease	1.85	24.4	5,203,767
Stroke	1.14	5.1	4,630,744
Hyperlipidemia	1.41	13.5	2,363,122
Pulmonary embolism	2.39	34.6	1,421,191
Colorectal cancer	1.16	5.7	774,414
Postmenopausal breast cancer	1.31	10.5	730,397
Endometrial cancer	2.19	31.1	483,339
		TOTAL COST	$68,182,031

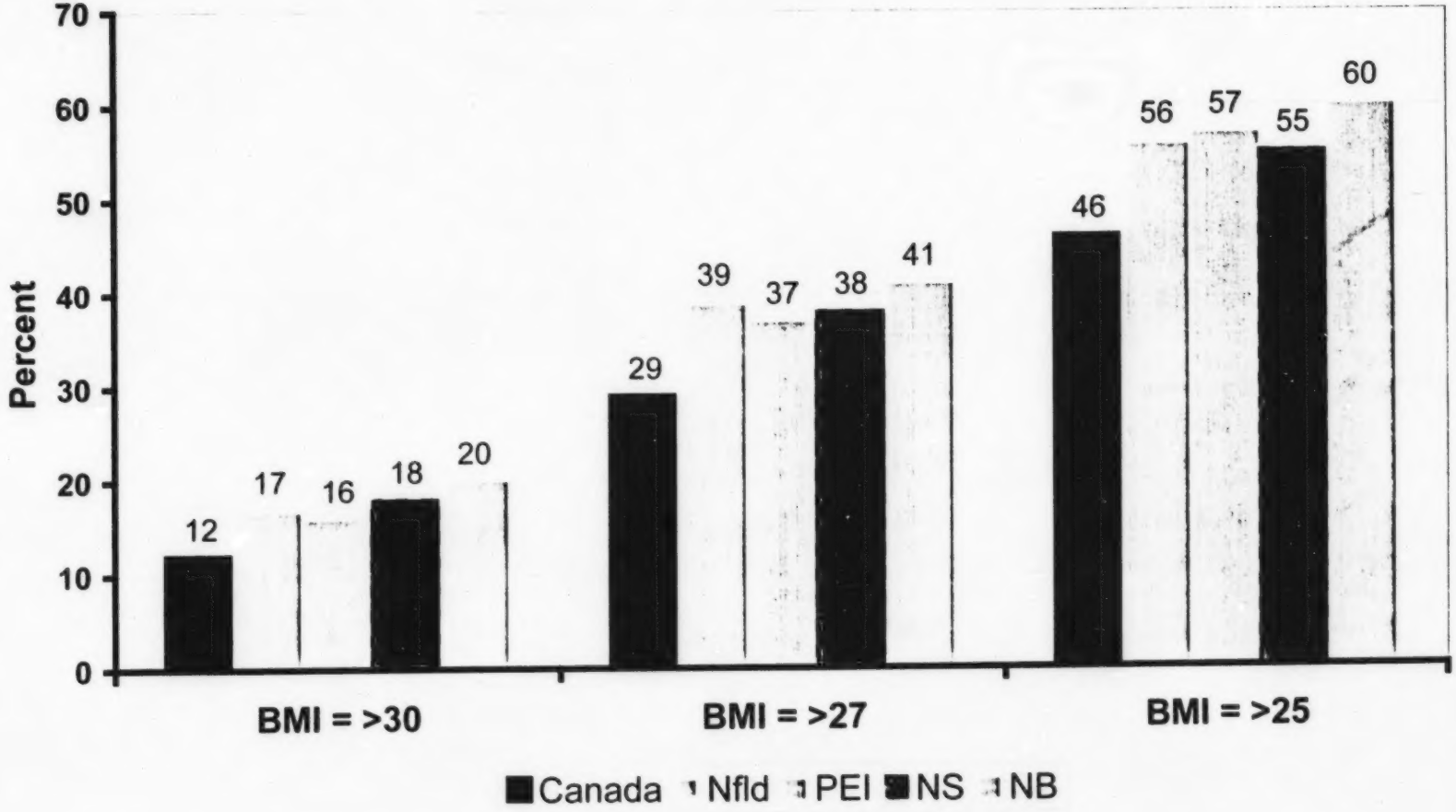
#1 - Overweight Canadians and Nova Scotians
Age 20-64, (BMI = >27), 1985 - 1997 (%)



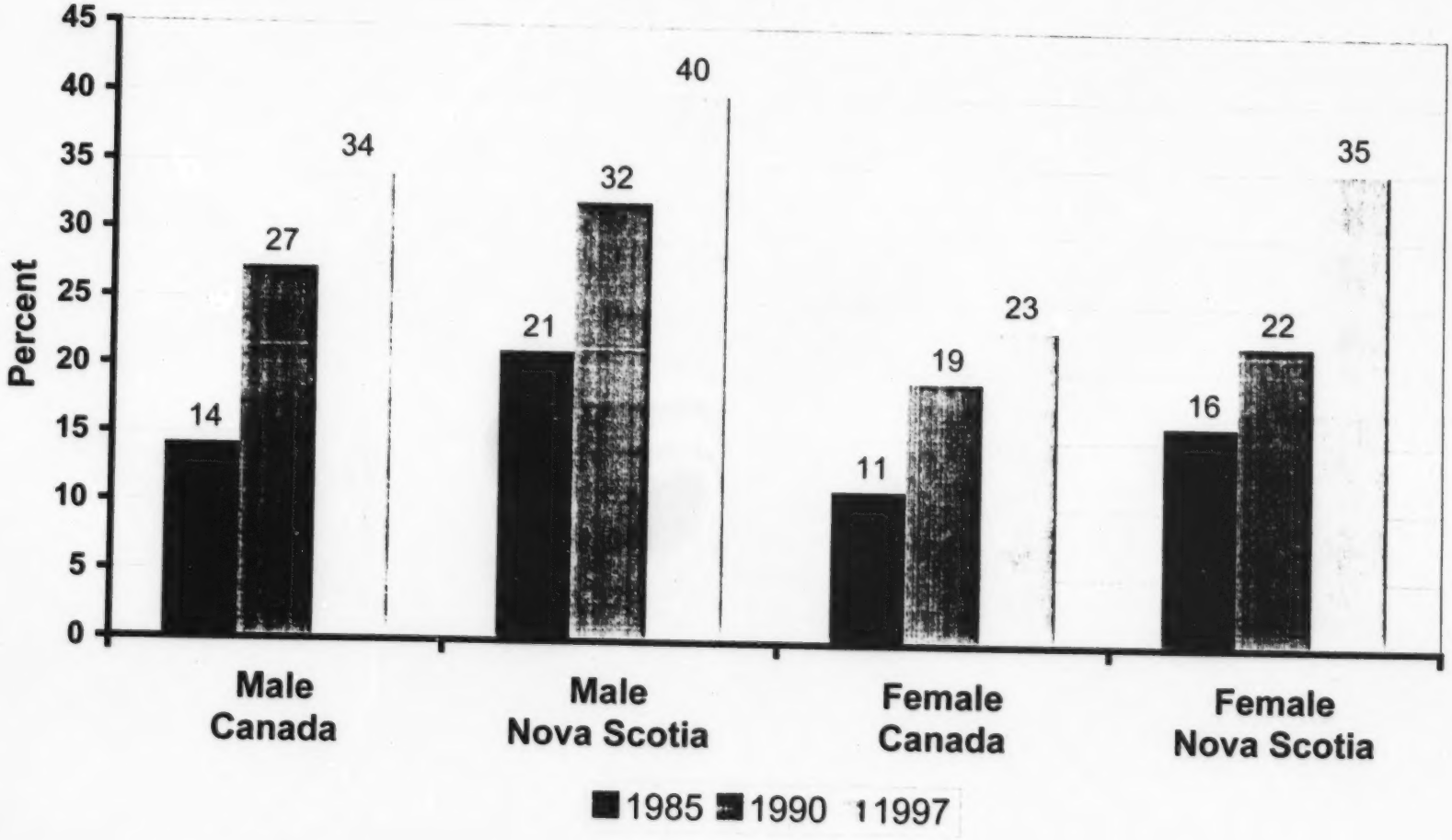
#2 - Overweight Canadians (BMI = >27), Canada and Provinces, Age 20-64, 1997 (%)



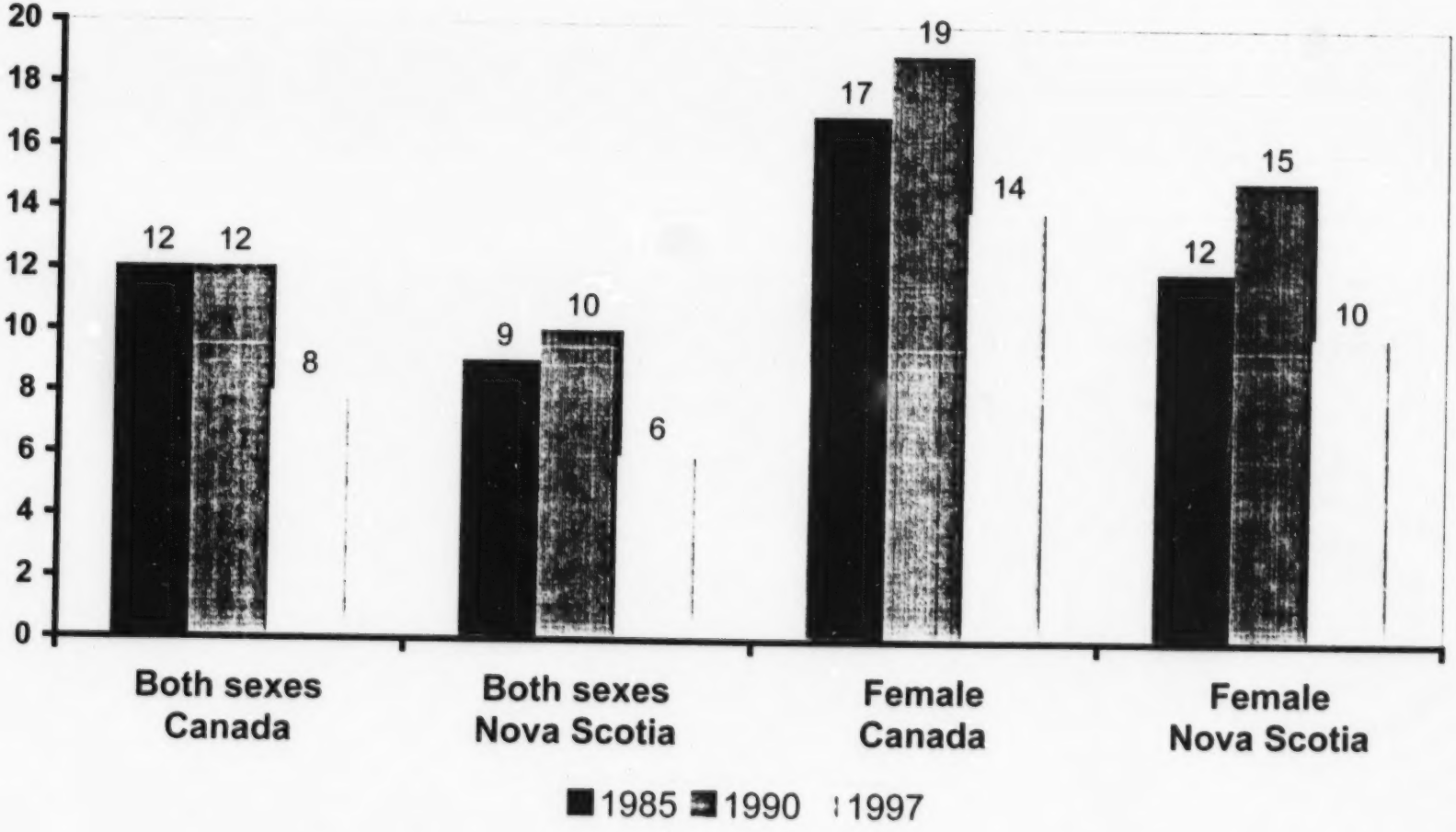
#3 - Overweight: Canada and Atlantic Provinces, Age 20-64, 1997



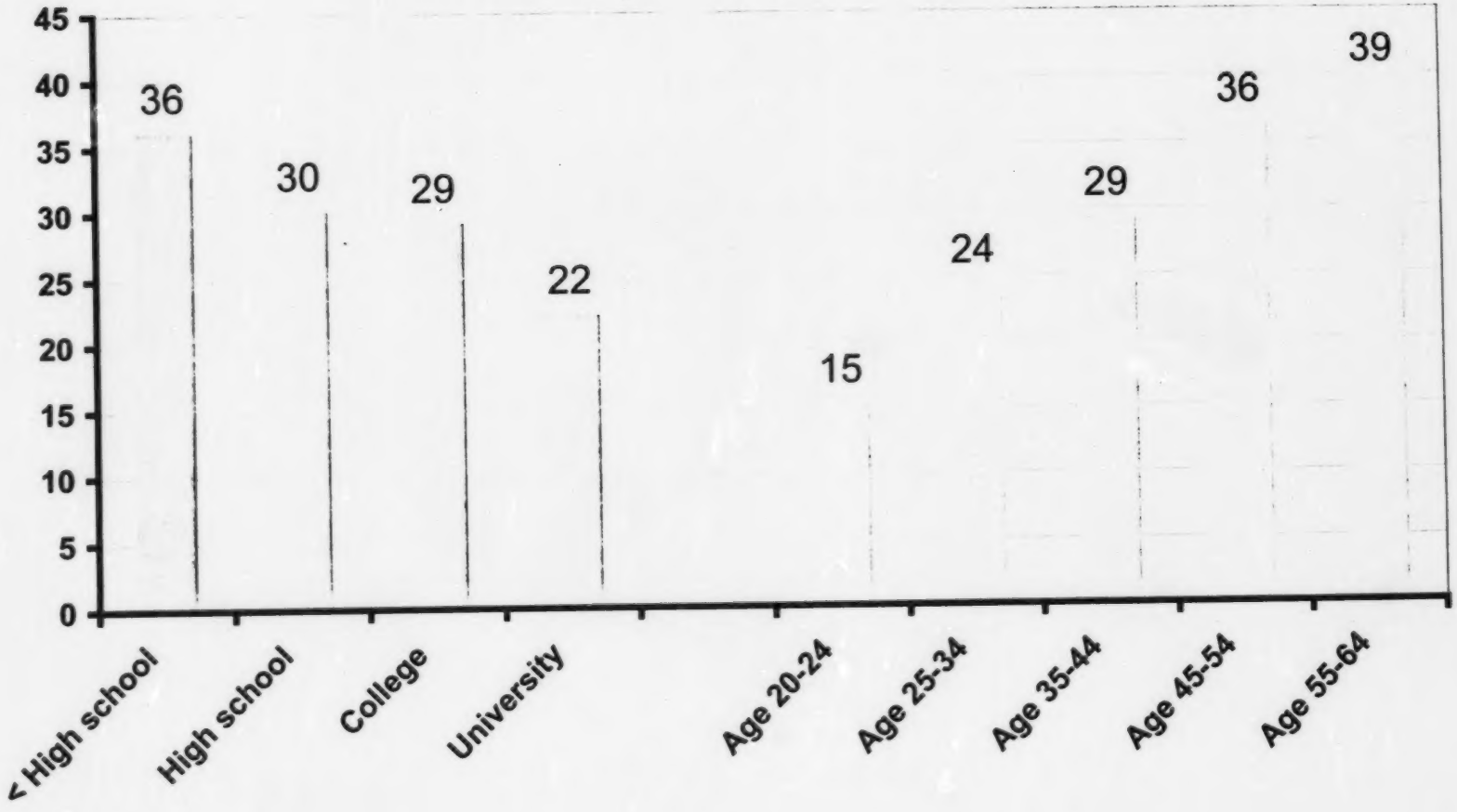
#4 - Overweight Men and Women (BMI = >27), Age 20-64, Canada and Nova Scotia, 1985-97 (%)



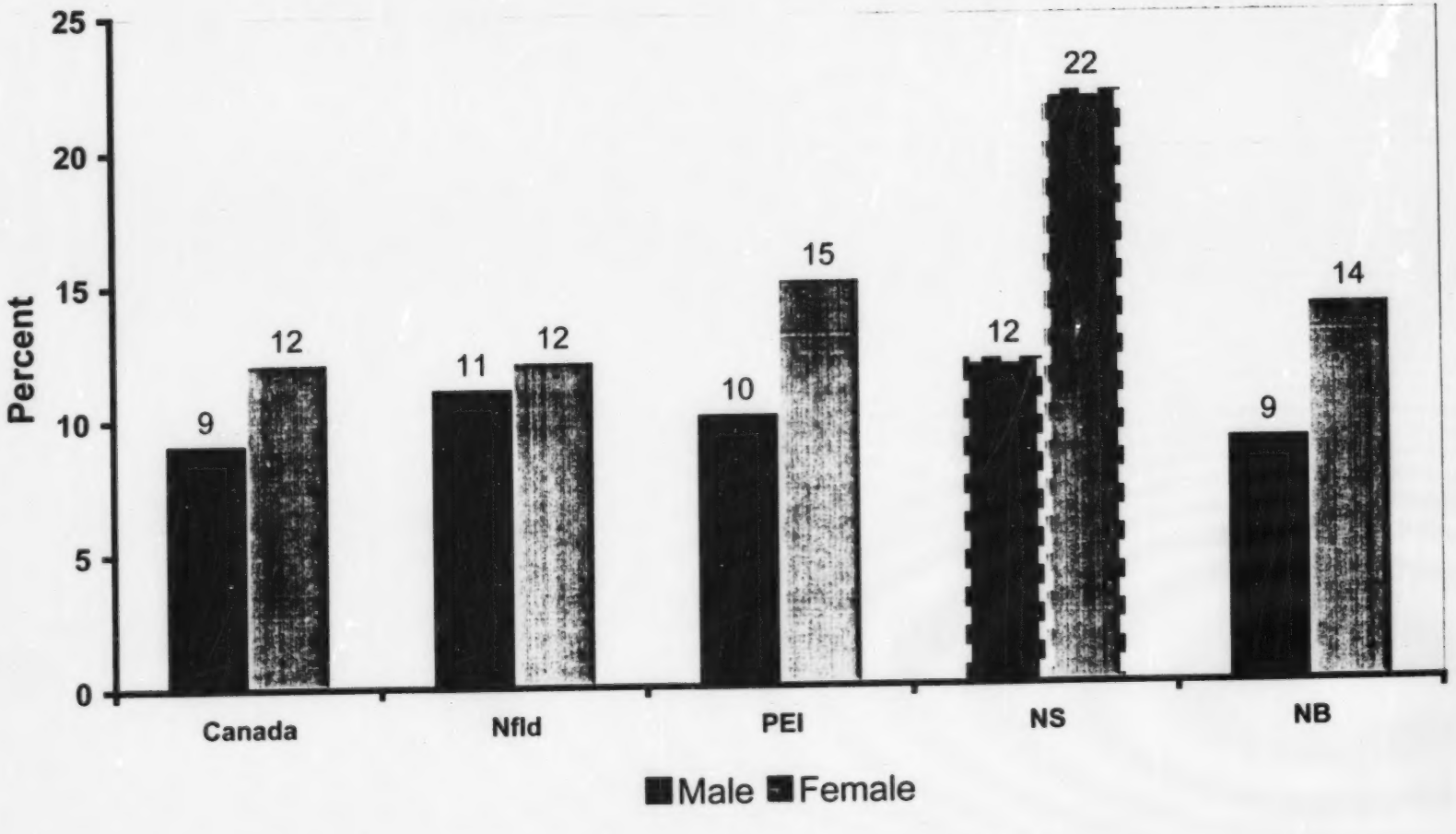
#5 - Underweight (BMI = <20), Canada and Nova Scotia, Age 20-64, 1985-97



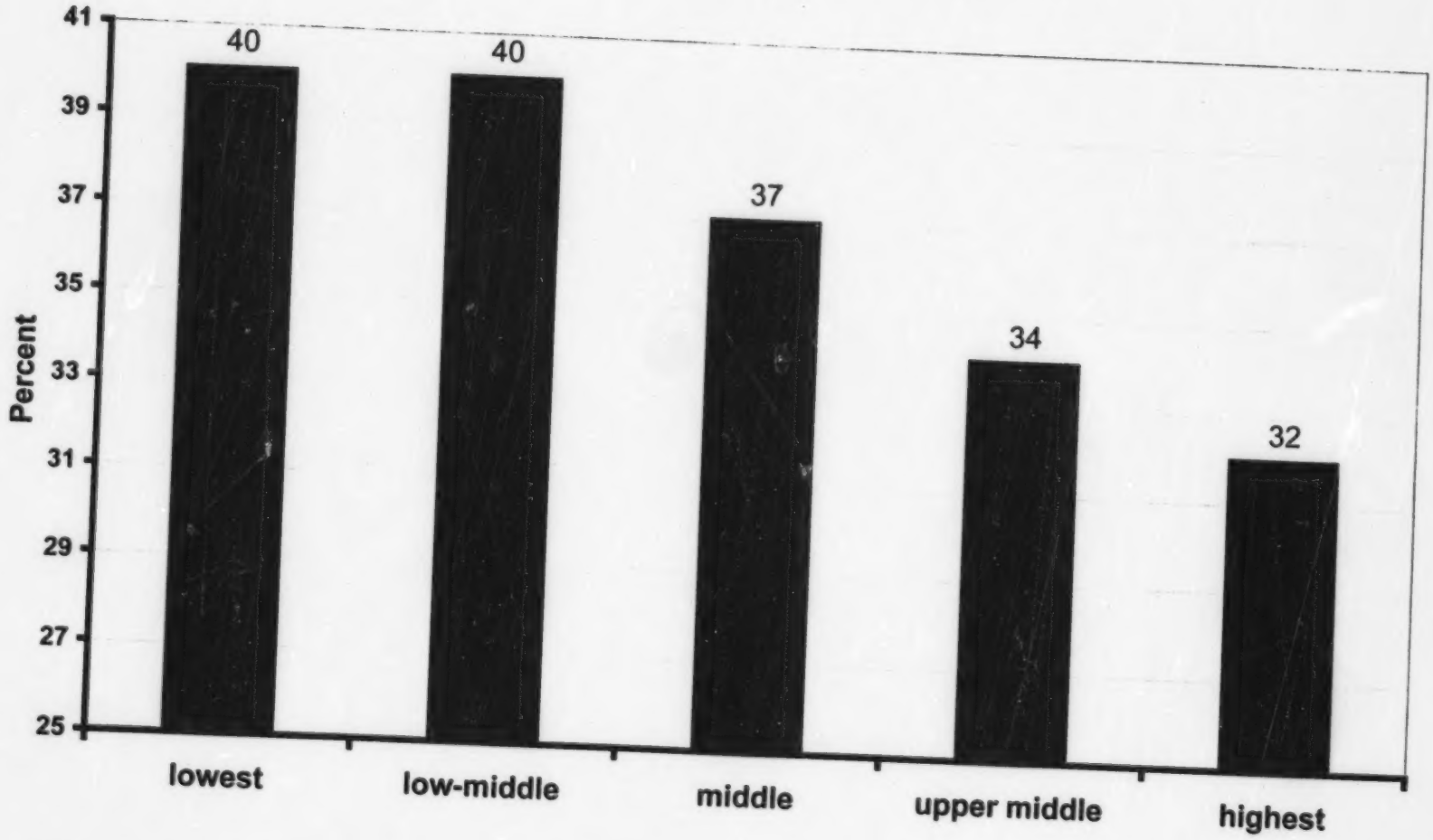
#6 - Overweight by Education and Age, Age 20-64, Canada and Provinces, 1997 (%)



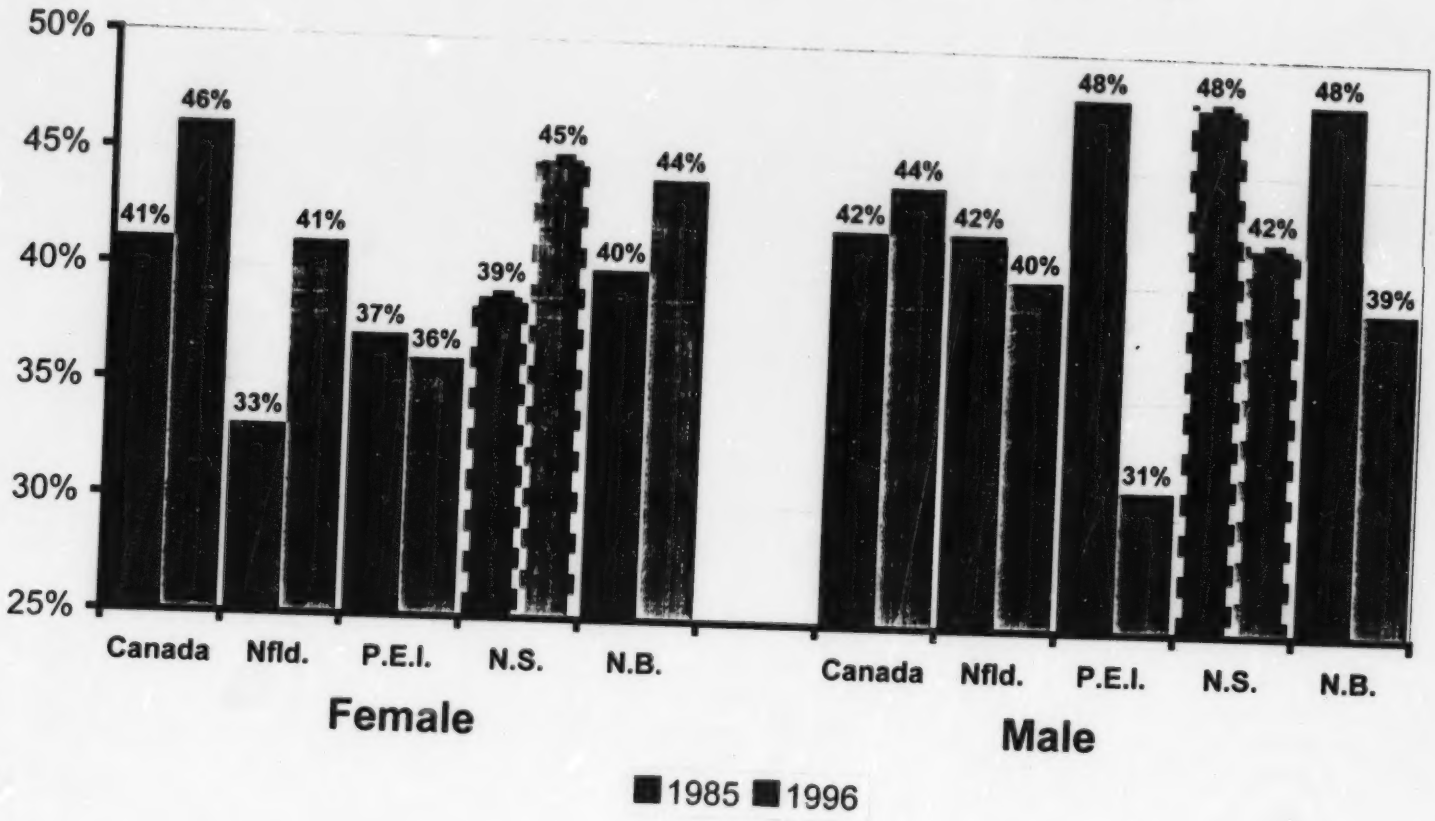
#7 - Population with High Blood Pressure, Canada and Atlantic Provinces, 1997 (%)



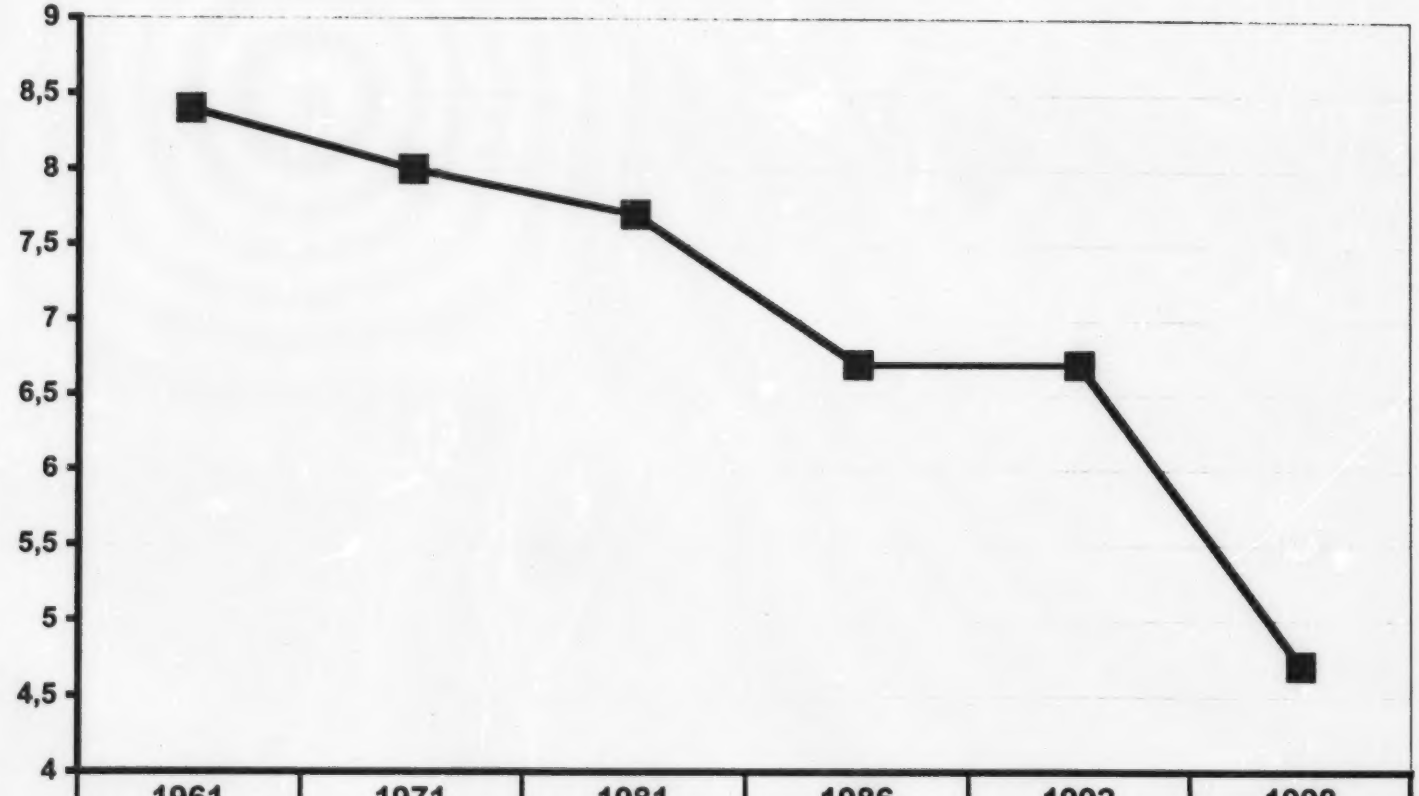
#8 - Percentage of Canadians Who Believe that Low Fat Foods are Expensive, 1994-95



#9 - Persons Who Exercise, 1985 - 1996 (%)

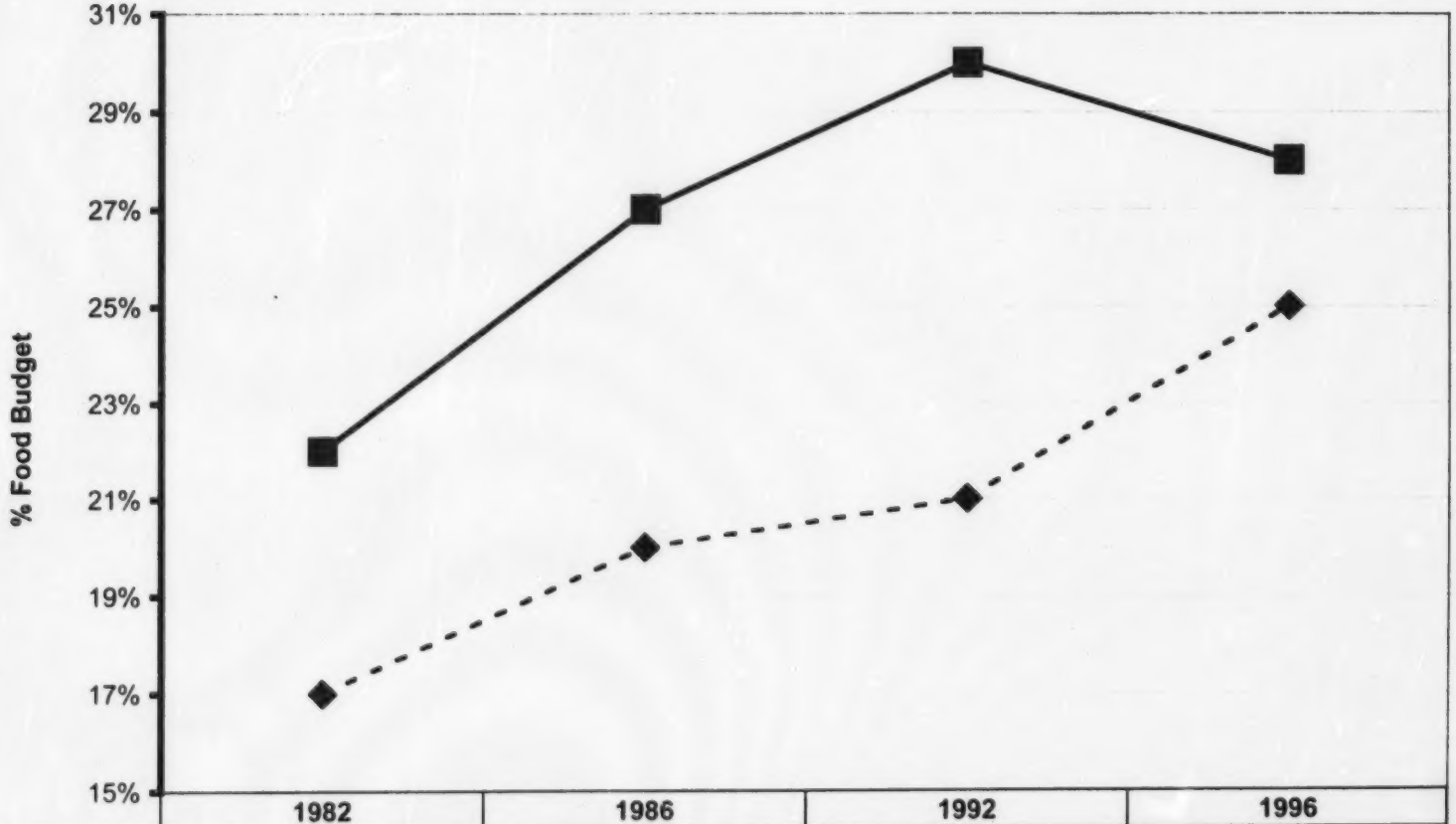


#10 - Hours per week spent Cooking and Washing Dishes, Nova Scotia, 1961-1998



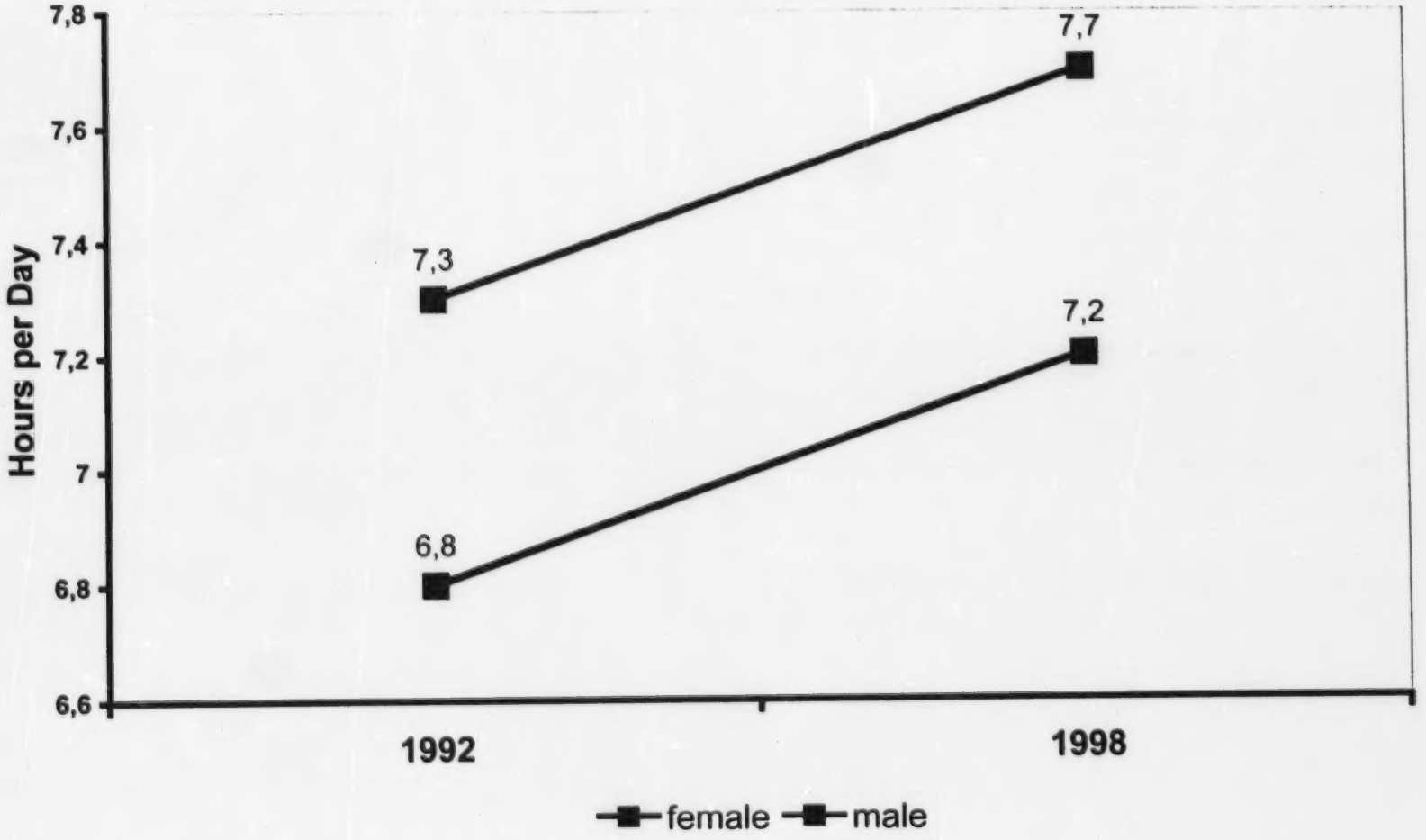
	1961	1971	1981	1986	1992	1998
Cook/Washup	8,4	8	7,7	6,7	6,7	4,7

#11 - Percentage of Household Food Budget Spent Eating Out at Restaurants and Take-Outs: Nova Scotia and Canada, 1982-1996

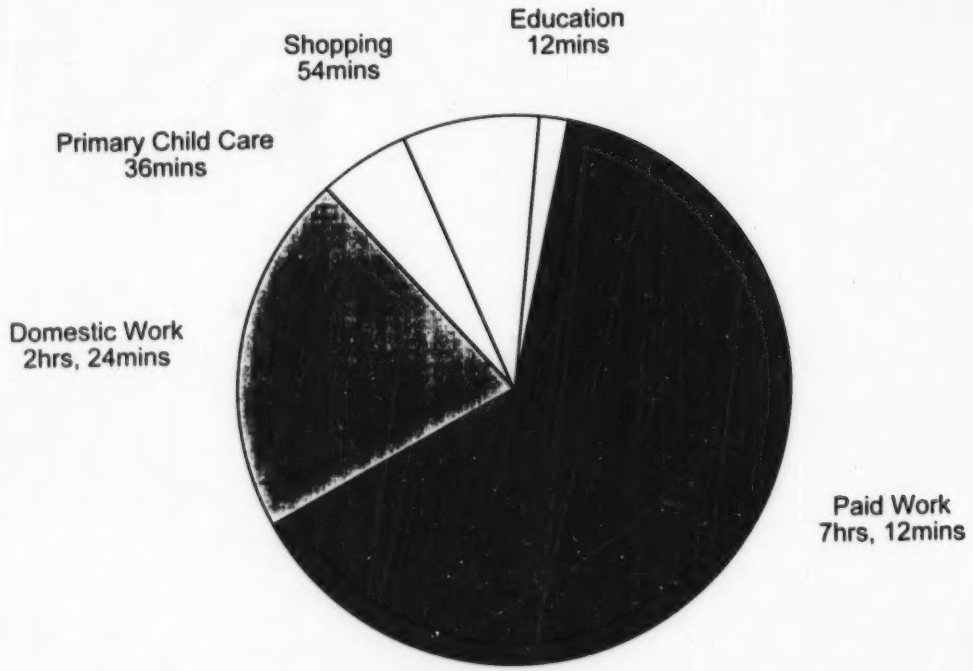


	1982	1986	1992	1996
N.S.	17%	20%	21%	25%
Canada	22%	27%	30%	28%

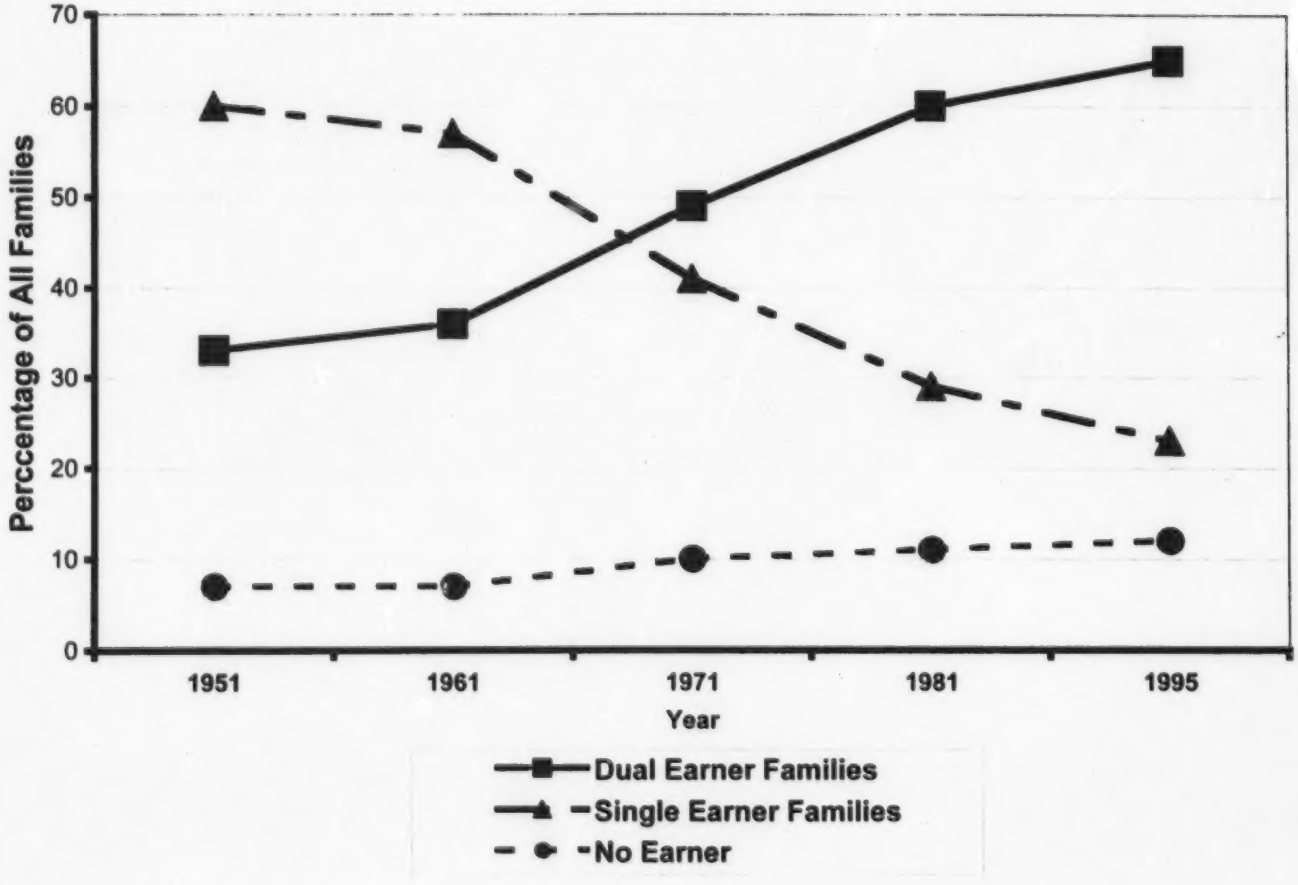
#12 - Total Daily Paid+Unpaid Work



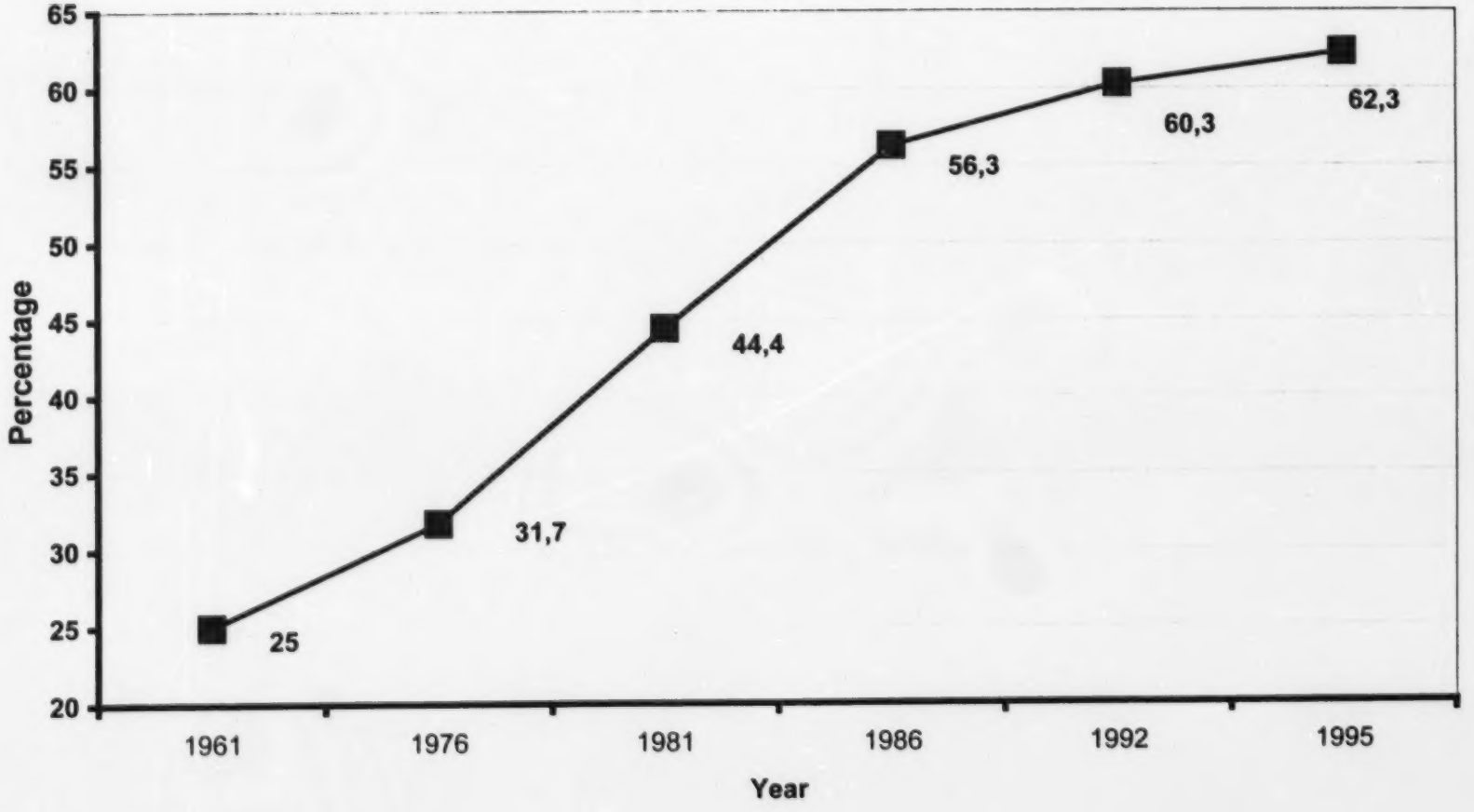
#13 - A Day in the Life of a Working Mother With Children Over 5 (Total Daily Work Time: 11 h 12 m)



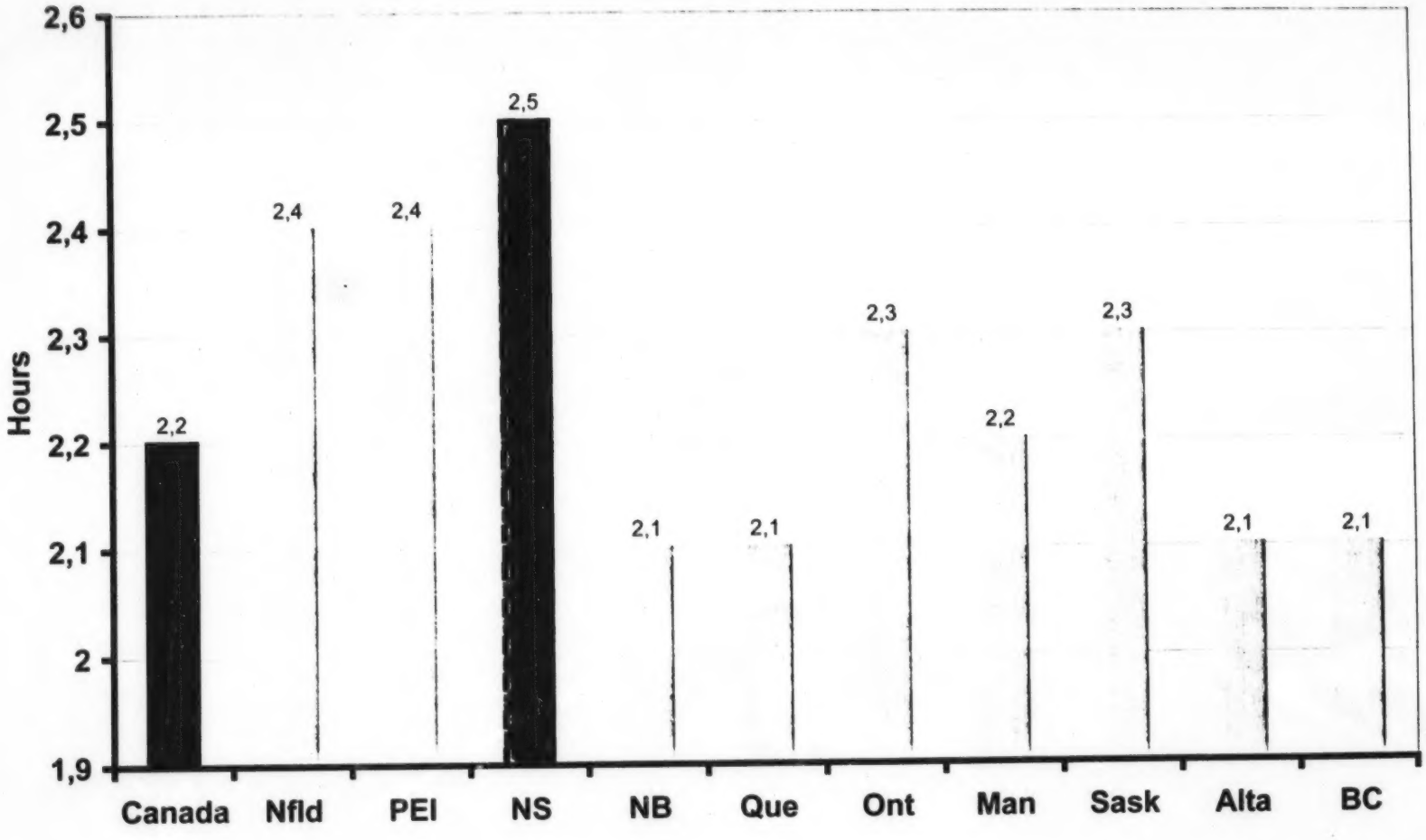
#14 - Dual-Earner Families as a Percentage of all Families in Canada



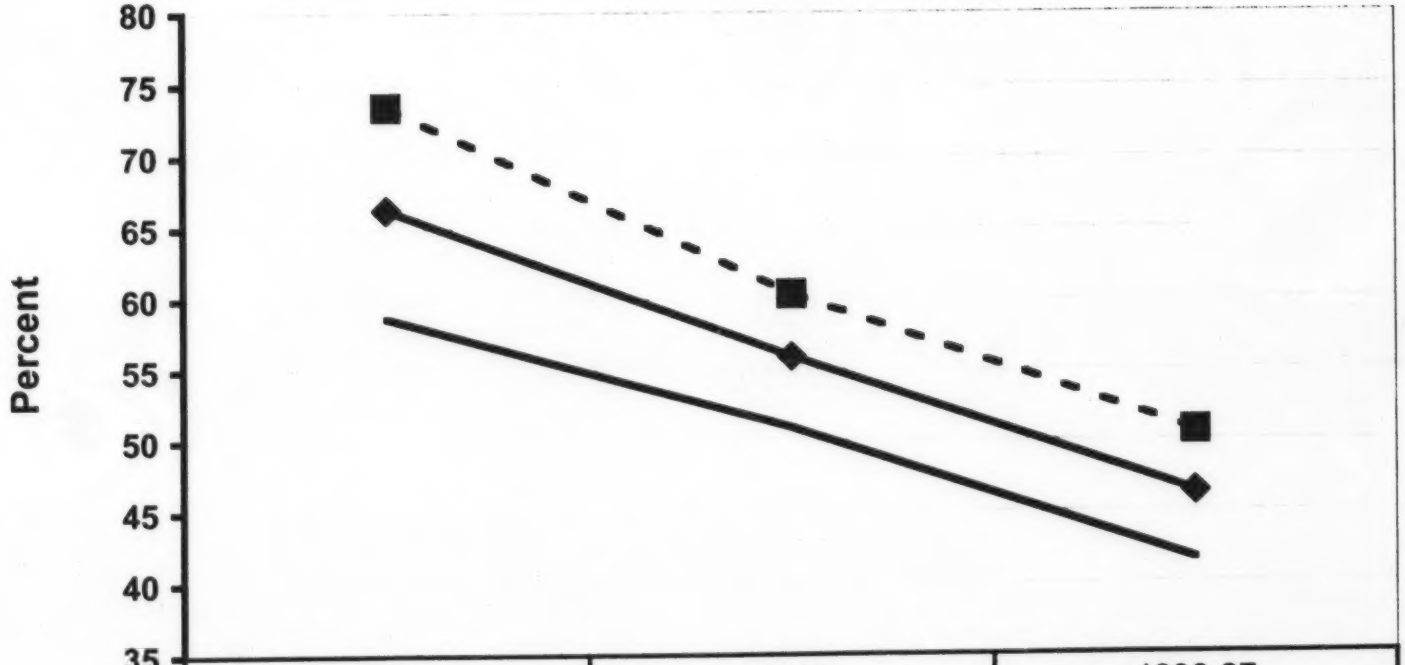
#15 - Labour Force Participation Rate of Mothers with Infants Aged 0-2, Canada, 1961-1995



#16 - Hours per day watching TV, GSS, 1998



#17 - Percentage of Nova Scotians desiring a change in their weight, 1985-97



	1985	1990	1996-97
Both sexes	66,3	55,9	46,3
Male	58,7	50,9	41,6
Female	73,5	60,3	50,6